SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

[The MINING JOURNAL is Registered at the General Post Office as a Newspaper, and for Transmission Abroad.]

No. 2568.—VOL. LIV. LONDON, SATURDAY, NOVEMBER 8, 1884. PRICE (WITH THE JOURNAL) SIXPENCE BY POST £1 4s. PER ANNUM.

ST SILVER MEDAL, ROYAL CORNWALL POLYTECHNIC
Highest Award for Effectiveness in Boring, and Economy in the Consumption of Air.
JUBILEE EXHIBITION, 1882.
THE PATENT
"CORNISH" ROCK DRILL.

FIRST SILVER MEDAL, MINING INSTITUTE OF CORNWALL.

FIRST AWARD BORING CONTEST DOLCOATH MINE, DECEMBER, 1881.

Prices and particulars on application to the Manufacturers,
HOLMAN BROTHERS,
CAMBORNE FOUNDRY AND ENGINE WORKS,
CAMBORNE, CORNWALL.

NGINES, AIR COMPRESSORS, TUNNELLING CARRIAGES, TRIPODS, &c.,
From own design, or to order.

THE PATENT
ECLIPSE" ROCK-DRILL
AND
"RELIANCE AIR-COMPRESSOR."
rst Silver Medal awarded at Boring Competition, East Pool Mine, Sept. 1883.

SILVER MEDAL—PARIS, 1878—HIGHEST AWARD

Are NOW SUPPLIED to the ENGLISH, FOREIGN, and COLONIAL GOVERNMENTS, and are also IN USE in a number of the largest MINES, RAILWAYS, QUARRIES, and HARBOUR WORKS in GREAT BRITAIN and ABROAD.

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SHIPBUILDERS, AND MARINE AND GENERAL ENGINEERING WORKS,
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All kinds of WROUGHT and CAST IRON STRUCTURAL WORK, cluding Girders, Tanks, Boilers, Colliery Plant, Winding Engines, n Coal Wagons, heavy Smith Forgings, Dock Gates and Caisons, l requirements of Harbour and Dock Works, &c., &c.
All Orders executed promptly, and Tenders from Plans and Specifications.

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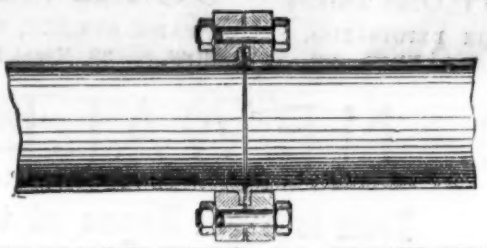
, LAURENCE POUNTNEY HILL, LONDON, E.C.

IMPROVED PATENT
INGERSOLL ROCK DRILL
MEDALS AND HIGHEST AWARDS.

American Institute, 1872.
American Institute, 1873.
London International Exhibition, 1874.
Manchester Scientific Society, 1875.
Leeds Exhibition, 1875.
Royal Cornwall Polytechnic, 1875.
Rio de Janeiro Exhibition, 1875.
Australia Brisbane Exhibition, 1876.
Philadelphia Exhibition, 1874.
Royal Cornwall Polytechnic, 1877.
Mining Institute of Cornwall, 1877.
Paris Exhibition, 1878.

WROUGHT-IRON STEAM TUBES.



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For Catalogues of Rock Drills, Air Compressors, Steel or Iron Steam Tubing Boiler Tubes, Perkins's Tubes, Pneumatic Tubes, and all kinds of Machinery and MINING PLANT, apply to—
LE GROS, MAYNE, LEAVER & CO.
60, Queen Victoria Street, London, E.C.

The New System for Working Gold, Stream Tin, and Diamond Alluvials.

THE "BALL PATENT."

9, BUSH LANE, CANNON STREET, LONDON, E.C.

This new system renders River and Placer Marsh Swamps and Plateau Mining the cheapest of all. No head of water required as per Californian Hydraulic System. Only a few tons of water wanted a day.

ABSOLUTELY CLEARS THE LAST PARTICLE ON RED ROCK OR CLAY BOTTOM.

No fall required for dumping tailings. Depths of rivers, floods, and other difficulties entirely surmounted. 600 tons a day raised, dispersed, washed, and dumped per day for 3d. a ton by smallest plant 1200 tons by second size plant at 2d. per ton.
See *Mining Journal*, 19th January and 16th February, 1884, on THE CHEAPEST METHOD OF TREATING AURIFEROUS ALLUVIALS.

NOTICE—TO MINING INVESTORS.
In such esteem is the system held that several extraordinary participations in Gold Alluvials are offered simply for the trouble of putting plant on certain concessions and working it.
Syndicate A completed.
Syndicate B completed.
WANTED, investors in C Syndicate.

Profits are very large, but it is deemed advisable not to publish them, and they will be only communicated to *bona fide* enquirers.

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With R. SCHRAM'S Patent
Inlet and Outlet Valves.
BOILERS, TURBINES.

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1600 in Use in all Parts of the World.

Complete Rock Boring Plants of the most approved construction for Railway Tunnels, Quarries, Shaft Sinking, Level Driving, Stoping, and Submarine Blasting.

All Kinds of Mining Machinery.

ESTIMATES AND FULL PARTICULARS ON APPLICATION.
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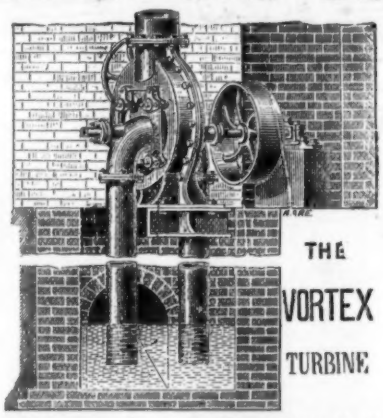
KENDAL, ENGLAND,
LATE
WILLIAMSON BROS.



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A most efficient means of applying Water Power to all kinds of Machinery.

Largely used in DRIVING AIR COMPRESSORS, PUMPING, WORKING ORE-CRUSHING MACHINERY, and for other purposes in connection with MINING.
Successfully used in ELECTRIC LIGHTING, and in utilising DISTANT WATER POWER by means of ELECTRICITY.

A Pamphlet containing a full description of the Vortex, with several Illustrations and a number of Testimonials, can be obtained on application.

New Patent Simplex Hammer Motion Stone and Ore Breaker.

S. MASON and Co.,
STONE MACHINE WORKS, LEICESTER,
Has been awarded the last MEDAL for their SIMPLEX STONE BREAKER.
It only has five wearing parts; others have 26.
LARGE SIZES.
Can be worked by hand.
Catalogue free on application.

N.B.—A Machine can be seen working at the Metropolitan Board of Works.

BELL'S ASBESTOS.

BELL'S PATENT ASBESTOS BLOCK PACKING for High-Pressure Engines

The following testimonials refer to this Packing:—

Mona Lodge, Amlwich, Anglesey,
2nd August, 1884.

DEAR SIR,—I have much pleasure in answering your note. Bad times in mining have compelled me to try all kinds of expedients in order to effect saving; some have succeeded and some have failed, but my underground manager, Capt. Hughes, has just said to me by the telephone—"The Asbestos Packing is the best thing ever brought here."

It saves money and trouble, but like my gas purifying oxide it lasts so long that you must not expect another order from me for twelve months at least.

Yours truly,
T. F. EVANS,
Late H.M. Inspector of Metalliferous Mines.

Mr. J. Bell.

Manchester, Sheffield, and Lincolnshire Railway—Steamship Department,
Grimsby, April 10th, 1884.

DEAR SIR,—I have much pleasure in stating that after a trial of over nine months, and comparing it with other packings, I can confidently recommend your Asbestos Packing. It is especially valuable when high-pressures are employed, as in cases where other packings have perished, owing to high temperatures, your packing has invariably stood well. I have also used it with complete success when a gland has heated with other packings, and also in cases of badly scored piston rods. I consider the results I have obtained by its use for our marine engines to have been in every way highly satisfactory.

Yours truly,
G. H. CLARKE, Sup. Engineer.

Mr. J. Bell.

Department of the Director of Navy Contracts,
Admiralty, Whitehall, 20th June, 1884.

SIR,—I have to inform you that your tender has been accepted for Bell's Rolled Cloth Asbestos Packing to sample submitted:—Elastic core ... ... Square.
" " ... ... Round.

To Mr. John Bell.

JOHN COLLETT, Director of Navy Contracts.

The Patent Block Packing is square, as Fig. 1 and Figs. 2 and 3 represent the Round Block Packing with solid and hollow rubber core, and Fig. 4 without core, but with rubber inlaid. As these packings are extensively imitated, and as it is a common practice among dealers and agents to supply the cheaper manufactures at my list prices, users are requested to see that the packing supplied to them bears the trade mark.

BELL'S ASBESTOS BOILER PRESERVATIVE.—This useful mixture by absorbing the free oxygen that is in the water entirely checks pitting and corrosion. It also disintegrates incrustation so immediately as to prevent its adhering to the plates. Not only is a great economy of fuel effected by keeping boilers clean, but the risk of having the plates burned is thereby obviated. It has been computed that 1/16 in. thick of incrustation causes a waste of 15 per cent. of coal; ¼ in., 60 per cent.; ⅛ in., 150 per cent. Thus the Preservative avoids the great risks which are inseparable from scaled plates, lengthens the life of a boiler, and covers its own cost a hundredfold by economy of fuel. It is entirely harmless, and has no injurious action on metals. It can be put into the feed tank or boiler, as may be most convenient. Sold in drums and casks bearing the Trade Mark, without which none is genuine.

BELL'S ASBESTOS YARN and SOAPSTONE PACKING for Locomotives and all Stationary Engines running at very high speed with intense friction.

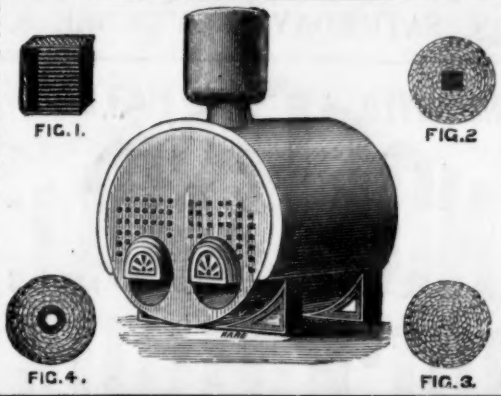
Sandwell Park Colliery, Smethwick, 1st February, 1884.

To Bell's Asbestos Works.

DEAR SIRS,—I have much pleasure in stating that I have used your Asbestos Packing for the last 13 months for our large winding engines which are running night and day, and also for the fan, pumping, and hauling engines at the above Colliery, and during that period we have not used more than one-third the Packing we had formerly; and this I attribute to your Packing on account of its great durability and general excellence of quality.—I am, dear Sirs, yours faithfully,
THOMAS WINTER, Colliery Engineer.

BELL'S ASBESTOS.

The goods of this house are of the highest quality only, and no attempt is made to compete with other manufacturers by the supply of inferior materials at low prices. All "home" orders should be sent direct to the undermentioned depôts and not through Agents or Factors.



BELL'S ASBESTOS BOILER AND PIPE COVERING COMPOSITION, for coating every class of steam pipes and boilers, non-combustible and easily applied when steam is up; adheres to metals and preserves them from rust; prevents the unequal expansion and contraction of boilers exposed to weather; covers 50 per cent. more surface than any other coating, and is absolutely indestructible. It can be stripped off after many years' use, mixed up with 20 per cent. of fresh, and applied again. The composition is supplied dry, and is only to be mixed with water to the consistency required for use.

A Horizontal Boiler, 17 ft. 6 in. long, 15-H.P., gave the following results:—

Temperature on Plates - - - 186 deg.
" " Covering - - 94 deg.

One ton of coal was saved per week, and although the fire was raked out every evening 20 lbs. of steam were found in the boiler next morning.

The following Testimonials refers to this Covering:—

Offices of the Wimbledon Local Board, Wimbledon, Nov. 28th, 1883.

DEAR SIR,—It may interest you to know that we save exactly 40 per cent. in fuel through using your covering.

Yours truly, W. SANTO CRIMP, C.E., F.G.S.

The Tamar and Kit Hill Granite Company (Limited),
Gunnislake, Tavistock, 8th April, 1884.

Mr. John Bell, Southwark, S.E.

SIR,—I have much pleasure in stating that the Asbestos covering applied by you to the boiler of our travelling crane at Kit Hill has yielded most remarkable results. Since it has been in use we have saved fully half our coals, and have effected a great saving in the time it takes to get up steam, which is often a matter of great importance to us. I should add that the crane runs on high gantries, and is fully exposed to all weather. I have formed the highest opinion of your Asbestos as used for this purpose, and as you are aware, have had another boiler similarly covered, though it has not since been used. I can most strongly recommend the material.

I am, Sir, yours faithfully, W. J. CHALK, Assoc.M.Inst.C.E., Engineer and Manager.

BELL'S ASBESTOS and INDIA-RUBBER WOVEN TAPE and SHEETING, for making every class of Steam and Water Joints. It can be bent by hand to the form required without puckering, and is especially useful in making joints of manhole and mudhole doors. It is kept in stock in rolls of 100 ft., from ⅛ in. to 3 in. wide, and any thickness from 1/16 in. upwards. Manhole covers can be lifted many times before the renewal of the jointing material is necessary. The same material is made up into sheets about 40 in. square, and each sheet bears the Trade Mark, without which none is genuine. It is very necessary to guard against imitations of this useful material, and to secure themselves against being supplied with these inferior articles at my price, users are recommended to see that every 10 ft. length of the Asbestos Tape purchased by them bears the Trade Mark.

BELL'S SPECIAL LONDON-MADE ASBESTOS MILLBOARD, for Dry Steam Joints, made of the best Asbestos fibre, is well-known for its toughness and purity, and is absolutely free from the injurious ingredients frequently used to attain an appearance of finish, regardless of the real utility of the material. Made in sheets measuring about 40 in. square, from 1-64th in. to 1 in., and ½ millimetre to 25 millimetres thick. Each sheet bears the Trade Mark.

The following copy of acceptance of tender refers to above:—

Department of the Director of Navy Contracts.
Admiralty, Whitehall, S.W., 17th May, 1884.

SIR,—I have to inform you that your tender for Asbestos Millboard has been accepted.—Mr. John Bell.

JOHN COLLETT, Director of Navy Contracts.

BELL'S ASBESTOS EXPANSION SHEETING (PATENT). This Sheeting is another combination of Asbestos with India-rubber, giving to the steam user the special advantages of both materials. The India-rubber Washer is protected from the action of heat and grease by an outer coating of vulcanised Asbestos cloth thus producing an excellent joint where expansion and contraction render other materials unserviceable. This material is admirably suited to steam pipe joints and every class of valve. Valves made of this material are very durable, as they are not subject to injury by oil.

BELL'S "ASBESTOS LUBRICANT." "REGD"

ILLUSTRATED PRICED CATALOGUE FREE ON APPLICATION TO

BELL'S ASBESTOS WORKS, SOUTHWARK, LONDON, S. E.

OR THE DEPOTS—118a, SOUTHWARK STREET, S.E.,

Victoria Buildings, Deansgate, MANCHESTER. 11 and 13, St. Vincent Place, GLASGOW. 39, Mount Stuart Square, CARDIFF. 21, Ritter Strasse, BERLIN.

R. S. NEWALL AND CO.,

Sole Patentees of Untwisted Wire Rope.

Iron & Steel Ropes of the highest quality for Collieries, Railways, Suspension Bridges, &c.

PATENT STEEL FLEXIBLE ROPES AND HAWSERS.

IRON STEEL, AND COPPER CORDS. LIGHTNING CONDUCTORS.

COPPER CABLES of high Conductivity for Electric Light and Power.

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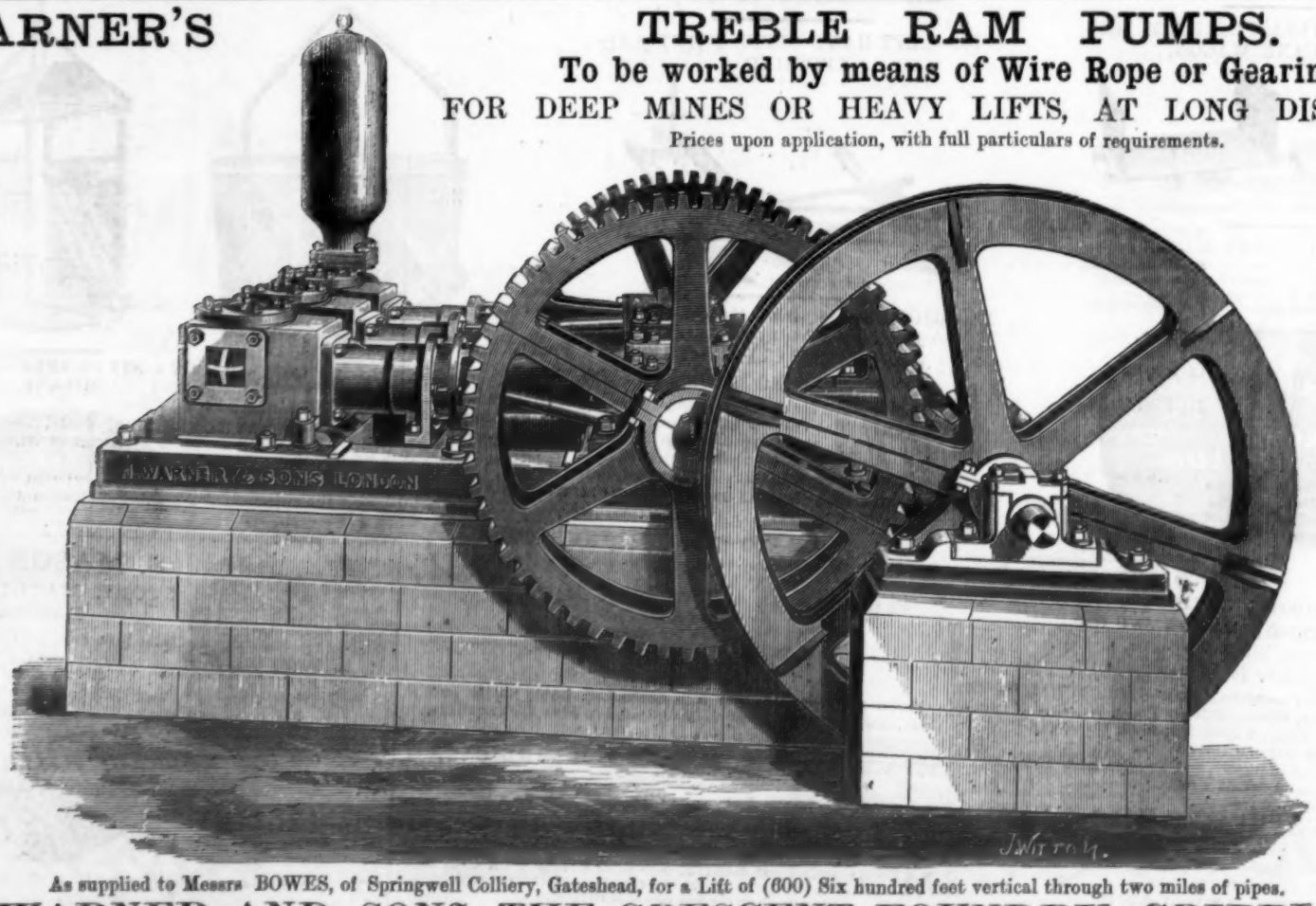
Glasgow: 68, ANDERSTON QUAY.
MANUFACTORY: GATESHEAD-ON-TYNE.

WARNER'S TREBLE RAM PUMPS.

To be worked by means of Wire Rope or Gearing.

FOR DEEP MINES OR HEAVY LIFTS, AT LONG DISTANCES.

Prices upon application, with full particulars of requirements.



As supplied to Messrs BOWES, of Springwell Colliery, Gateshead, for a Lift of (600) Six hundred feet vertical through two miles of pipes.

JOHN WARNER AND SONS, THE CRESCENT FOUNDRY, CRIPPLEGATE, LONDON, E.C.

R. HUDSON'S

Patent Steel Trucks, Points and Crossings,

PORTABLE RAILWAY, STEEL BUCKETS, &c., &c.

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In connection with the Leeds Exchange, and all the principal Hotels and places of business in the town.

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Registered Telegraphic Address:—
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A. B. C. Code used.

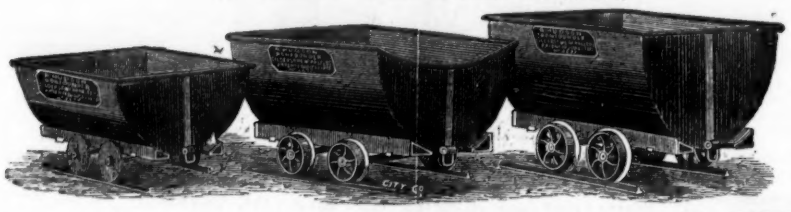
UPWARDS of 25,000 of these Trucks and Wagons have been supplied to the South African Diamond Mines; American, Spanish, Indian, and Welsh Gold, Silver, Copper, and Lead Mines; Indian and Brazilian Railways, and to Railway Contractors, Chemical Works, Brick Works, and Coal and Mineral Shippers, &c., &c., and can be made to lift off the underwork, to let down into the hold of a vessel, and easily replaced. They are also largely used in the Coal and other Mines in this country, and are the LIGHTEST, STRONGEST, and most CAPACIOUS made, infinitely stronger and lighter than wooden ones, and are all fitted with R. H.'s Patent "Rim" round top of wagons, requiring no rivets, and giving immense strength and rigidity. End and body plates are also joined on R. H.'s patent method, dispensing with angle-irons or corner plates.

Patented in Europe, America, Australia, India, and British South Africa, 1875, 1877, 1878, 1881, and 1883.
N.B.—The American, Australian, Indian, and Spanish Patents on Sale.

CAN BE MADE TO ANY SIZE, AND TO ANY GAUGE OF RAILS.

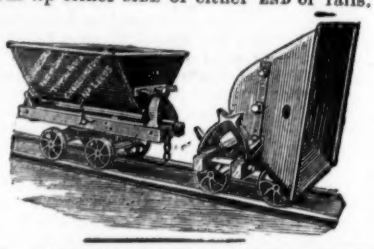
1.—PATENT STEEL END TIP WAGONS.

7.—PATENT STEEL MINING WAGONS.

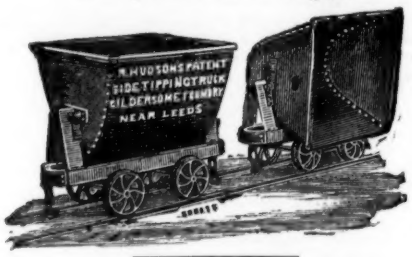


12.—PATENT STEEL HOPPER WAGON, WITH BOTTOM DOORS.

2. PATENT UNIVERSAL TRIPLE-CENTRE STEEL TIPPING TRUCK,
Will tip either SIDE or either END of rails.



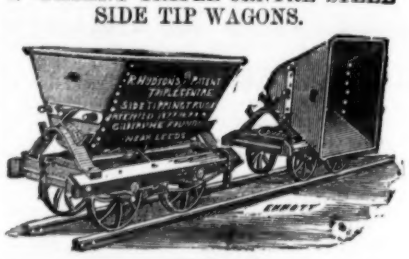
8.– PATENT DOUBLE-CENTRE STEEL SIDE TIP WAGONS,
Will tip either side of Wagons.



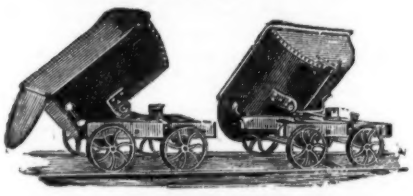
13.—PATENT STEEL HOPPER WAGON.

ONE man can EASILY tip ANY WEIGHT in these wagons.

3.—PATENT TRIPLE-CENTRE STEEL SIDE TIP WAGONS.

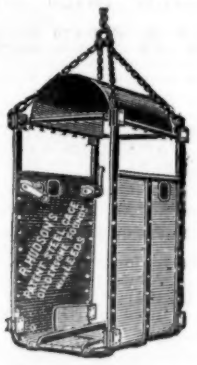


9.—PATENT STEEL ALL-ROUND TIP WAGON.

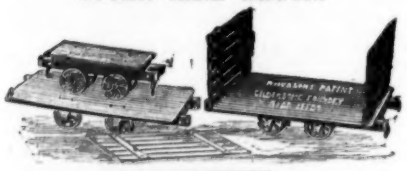


14.—SELF-RIGHTING STEEL TIP BUCKET.
(The "CATCH" can also be made SELF-ACTING if desired.)

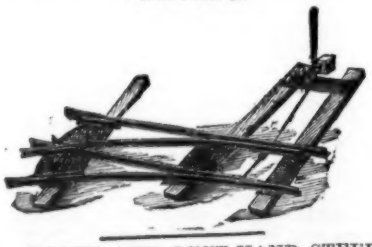
15.—STEEL CAGE.



4. –PATENT STEEL PLATFORM OR SUGAR CANE WAGON.

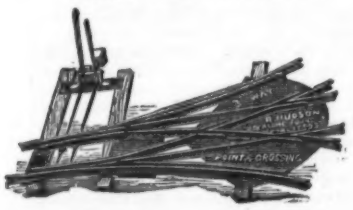


10.—LEFT-HAND STEEL POINT AND CROSSING.



5.—PATENT STEEL CASK.
As supplied to H.M. War Office for the late war in Egypt).
DOUBLE the STRENGTH of ordinary Casks without any INCREASE in weight.
(Made from 10 gals. capacity UPWARDS to any desired size.)

11.—RIGHT AND LEFT-HAND STEEL POINT AND CROSSING.



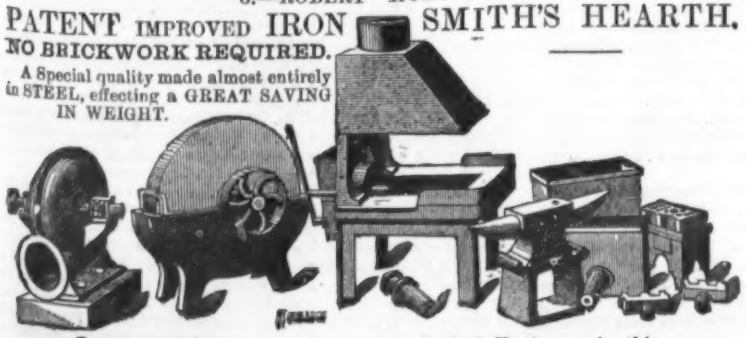
16.—PATENT STEEL WHEELBARROWS.
Made to any Size.
Lightest and Strongest in the Market.

A great success.

17.—STEEL SELF-CONTAINED TURNTABLE.

(Also made in CAST Iron for use where weight is not a consideration.

6.—ROBERT HUDSON'S PATENT IMPROVED IRON SMITH'S HEARTH.
NO BRICKWORK REQUIRED.
A Special quality made almost entirely in STEEL, effecting a GREAT SAVING IN WEIGHT.



Large numbers in use by all the principal Engineers in this country and abroad.

No. 19.—PATENT STEEL CHARGING BARROW,
DOUBLE the STRENGTH & much LIGHTER than ordinary Barrow

18.—"AERIAL" STEEL WINDING TUB.

Largely employed in the South African Diamond Fields.

ALL KINDS OF BOLTS NUTS, AND RIVETS MADE TO ORDER ON THE PREMISES

Pumping Engines for Mines, Water Works, Sewage Works, and General Purposes.

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PUMPING & MINING MACHINERY.

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Hydraulic Pumps, Winding Engines, Air Compressors, Man Engines, Capstans, &c., &c.

APPLICATION.

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A handsome SKETCH MAP, printed in FIVE COLOURS, and showing the Geological Formation, the Direction of the Lodes, and other useful details. Will be forwarded on receipt of remittance.

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Designed for effecting in minutes what has hitherto taken hours to accomplish.
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For Accountants, Merchants, Public, and Private Offices.
By WILLIAM WETHERED.

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NEW SOUTH WALES MARBLE.—Several beds of very fine marble or crystalline limestone occur in different parts of the colony, as at Wollondilly, whence one of the marbles, used in paving the great hall of the University, the Post Office, and other public buildings in Sydney, has been obtained. Much of the Wollondilly so-called white marble is of a creamy tint, variegated with pale red and light blue streaks. A slate-coloured marble used in the same buildings is brought from Marulan, near Goulburn. There is a beautiful white saccharoid marble at Cow Flat, near Bathurst. A brecciated slate-coloured marble streaked with white calcite occurs at Wallerawang, County Cook. Beautiful marbles occur at Mudgee and Orange, also at Wellington, celebrated for its caves. At Bangalore, on the Goulburn Plains, there is found a white crystalline marble; at Yass and Queanbeyan, County Murray, good grey and white crystalline marbles are found along the banks of the Murrumbidgee, the Belubula river, and the Canomodine Creek, in the Orange district; blue-grey limestone at Warialda, County Burnett. The outcrops of small seams of grey crystalline limestone or marble are seen exposed in the Minumurra Creek, near Jamberoo, County Camden, interbedded with the coal, shale, and sandstones of that district. A specimen from a 2-in. band in the Minumurra Creek was slightly crystalline, of a grey colour, with a few thin streaks of a lighter colour. Small patches of a pale green mineral were detected in parts, something like glauconite in appearance.

INTERNATIONAL HEALTH EXHIBITION.—Mr. EDWARD STANFORD, of Charing-cross, was awarded the only gold medal for maps gained by any British exhibitor at the International Health Exhibition, South Kensington (Class 48, Education), by the International Jury for his exhibit in the Royal Albert Hall.

MINERS' BENEFIT SOCIETIES—THE MINERS' FUND OF NEW ALMADEN—No. II.

BY SAMUEL B. CHRISTY, UNIVERSITY OF CALIFORNIA, BERKELEY, CAL.

The summary of the monthly reports of physicians will give an idea of the amount of work done. The summary of monthly reports 1874 to 1883 inclusive—ten years—shows:—Number of patients visited at their homes, 42,156; number of patients visiting office, 41,238; number of vaccinations, 729; number of salivation cases treated, 26; number of confinements, 209=84,358 cases. The list of receipts and disbursements for the whole period during which the fund has been in existence, that is, for the 13 years ended Dec. 31, 1883, shows:—Receipts: From collections, $80,447·30; sales of medicine, $2484; obstetric cases, $1230; outside practice, $98; donations, $24·75; sale of horse, $126·50; loans repaid, $345; interest on deposit in bank, $2551·50 = $87,357·05.—Disbursements: Salary of physicians, $47,711; medical stores, $13,283·11; contributions to sick and disabled, $4019·24; commissions for collector and secretary, $3842·34; hospital nurses, $2748·82; consultations (fees), $1648; livery, $1425·78; funeral expenses, $865·90; board for patients, $736·65; furniture, $532·84; surgical instruments, $501·42; office boy, $418·75; incidental expenses, $486·97; loans, $345; subscriptions to medical journals and works, $312·40; disinfectants, $252·92; small-pox hospital, $55·25; collections refunded, $27·50; taxes, $18; fuel, $15·22; apothecary's salary, $275 = $79,522·11; leaving balance deposits in banks, $7544·32; cash at mine, $290·62 = $7834·94.

The company furnishes to the fund at the present time stabling for a horse, and all the necessary buildings for offices, hospitals and dispensary, and dwelling for physician, free of expense. If we assume the same rate for the whole 13 years as for the last 10, as shown by the monthly reports during that period, it would make the total number of visits made or received by the physicians, 109,665. The salary of physicians during this period was $47,111. This would make the actual cost to the members of the fund less than 44 c. per visit. This, compared with $25 a visit, the original cost, or even with the price that the inhabitants of large cities pay for similar service, is a very satisfactory showing. Now, if we divide the total disbursements $79,522·11 by the total number of visits during the 13 years, we have an average cost of 72½ c. per visit, including all expenses, incurred by the fund, such as medicine, nurses, loans, hospital expenses, physicians' salary, and administration. All this has been secured practically without cost to the company.

To the naturally improvident Mexican, the establishment of the fund has been of great value. The present arrangement saves both the miner and his family from considerable suffering in case of sickness or inability to work. The Cornish miners are usually more frugal; but they mostly have large families, and get the full value of their contributions in the way of attendance during the year. The fund as now arranged seems well adapted to meet the peculiar conditions under which it operates with apparent general satisfaction. Dr. Winn, to whose kindness I am indebted for most of this information, tells me that during the 4½ years of his services at the mine, he has heard of only two complaints. These were from two labourers who worked a couple of months on the roads, and did not happen to be sick while they were engaged. Considering the large and varied population, this absence of dissatisfaction is high praise for the manner in which the fund has been administered.

URUGUAY, AND ITS MINES.

As the mineral resources of the Republic of Uruguay are about to be again brought before the notice of European capitalists, some details may be interesting concerning the Cunyapirû district, as it is understood that the San Gregorio Mine, situated therein, will be among the first for which capital will be sought. The name of this mine is not new to Europe, it having been for some time in the hands of a French company, who after partially working it were obliged, owing to the failure of their bankers, bad administration, and inefficient machinery, to liquidate and return the mine to its owners. This district, which is intersected by the River Corrales, has, Dr. Joaquin Zelaya reports, besides the mine mentioned a large number in course of working. The hill San Rafael contains several pits and a large number of superficial prospects, situated on five auriferous quartz veins. These quartz veins are almost parallel, and at the surface commence with very thin sproutings, attaining a medium thickness of from 30 to 40 centimetres, at a depth of 8 metres, but having a regular thickness at a depth of 15 to 18 metres. The rock of Corrales is of primitive porphyry, abounding in felspar, and it is an important fact that the quartz of this region contains metallic veins of such regularity, as are not met with in any other part of the earth. Not only is that so, but the quartz veins are separated from the adjacent rocks and beds by thick layers of clay, mixed with many hydrates of iron, which being very soft allow the veins to be cut round or isolated with ease.

This, he continues, is a great point towards remunerative mining in this district, as it allows of the extraction of the quartz at a minimum expense. The mines have only attained a depth of 6, 15, and 18 metres, when they can only be considered to commence to become regular. This fact is most evident in Corrales, since the veins worked at a depth of 18 metres are the best formed, and produce actually a rich yield.

The number of veins discovered already considerable will with a little labour be no doubt increased, and it is worthy of note that these veins form parallel lines to each other. The veins are almost vertical, and though often failing it only needs to slightly alter the course of the workings towards the west to again meet with the vein. Fissures filled with iron and silicate are frequently met with. Gold, according to the Doctor, always follows the iron, for which reason its abundance is in direct relation to that of the latter; wherever the iron is anhydrous gold will exist in a larger proportion, and the iron in the quartz takes a steely (calcined) appearance. There are two chief classes of quartz in the district—1. That in grains or pieces yielding the highest standard—2. That in which the gold is found in leaves, which is the most plentiful. It is asserted that all quartz impregnated with iron extracted from present workings will yield more than 20 grammes metallic gold susceptible of immediate amalgamation per ton of ore. Upwards of 4000 tons of ore have been extracted from the mines of San Gregorio before referred to, of which more than 1000 tons yielded an average of upwards of 1·5 oz. of gold per ton of ore. An average sample of 27 cwts. has lately been sent to Mr. A. Deloime, of London, who has had it all finely crushed, carefully sampled, and assayed, and found to yield fine gold 4·100 ozs., and silver 1·750 ozs. to the ton of ore.

It is estimated that the maximum cost of extraction and refining at this mine would be at most 2*l.* per ton, and also that from the 38 acres comprising the San Gregorio Mine auriferous quartz may be extracted for many years at the rate of 700 tons per diem of 24 hours, containing an average of 3 ozs. of gold per ton. This would give 604,800 ozs. per annum of, say, 2,343,600*l.* in value. There is steam communication two or three times a week between Salto and Monte Video, Salto being about 40 leagues from the mine, and connected by a cart road.

Died,—The death is announced of Mr. Henry J. Jackson, superintendent engineer to the General Steam Navigation Company, at their works, Deptford.

THE DUTY AND MAINTENANCE OF HUSBAND'S OSCILLATING CYLINDER STAMPS.

In the preparation of this paper, read at the recent meeting of th Mining Institute of Cornwall, and of which an abstract appeared in last week's *Mining Journal*, Mr. Derry's object is to record the extraordinary performance of these stamps in the most concise and simple manner, and by dealing with the salient and important points afford the members of this Institute material from which to form their own conclusions. I have, he says, avoided as far as possible, the expression of mere opinion, the value of which would be open to question, and confined myself generally to a narration of facts that are indisputable; and, before proceeding further, I may remark that I am duly impressed with the importance of these communications, the necessity for caution in furnishing statistics, and the possible consequences of misrepresentation even though unpremeditated. I have, therefore, adopted unusually precautious measures to prevent the slighest error in details or in figures.

Four of these stamps are at work on the Owen Vean and Tregurtha Downs Mines. In July last a descriptive paper by Mr. Loam was read at the meeting of the Polytechnic Society, at Falmouth, from which I give a few extracts. Mr. Loam says:—"Since the appliances for the full and continuous supply of tinstone have been completed we have stamped with 4 heads regularly over 20 tons per head per day; and on Thursday, the 7th instant, upon trial the result was a total of 93 tons 16 cwts., or 23 tons 9 cwts. per head; the consumption of coals was 4 tons 3 cwts. Every blow is complete in itself in the reduction and discharge of its product from the coffer. There is no perceptible variation in the fall of the head, and the coffer is cleared at every blow. The engine and steam-pipes are not yet cased, and the boiler-house roof is not fixed; we are, therefore, not working under favourable economic conditions."

These facts by Mr. Loam are justified by our subsequent experience. The first two heads were started on June 7, the remaining two on June 21 last. From causes wholly unconnected with themselves the stamps have not been constantly at work since their erection. The reasons will be readily comprehended by persons experienced in the starting of mines with new and extensive plant in every department. Means of supply have been deficient. I am safe, however, in saying that three months is considerably within the actual time of constant running.

I will now take the performance from Sept. 1 to Sept. 28 as fairly representating their duty throughout, and this—including stoppages for oiling, changing heads and grates, and all other work necessary for the maintenance of the stamps in perfect order. I find it to consist in the reduction of 2000 tons 15 cwts. of 21 cwts. to the ton in 23 days 5¾ hours, being at the rate of 86 tons per day of 24 hours.

The lodestuff stamped was principally chlorite, of probably about the average hardness of rock stamped in Cornwall. The maximum speed was 125 and the average barely (as far as I could judge) 122 blows per minute. The copper grates were very fine; 36 hole, three grates of equal size to each coffer, and each having a perforated area of 21½ in. square. The stone was sent into the passes fully 30 per cent. larger in size than the standard adopted in the county for the supply of stamps of the old sort.

The quantity of grate water was very small compared with what, I am informed, has been supplied to this kind of stamps elsewhere; and herein lies probably, to a great extent, the secret of the extra work they have performed here. Soon after starting our tin-dresser expressed an opinion that the large quantity of water impeded the exit of the stamped stuff through the grates, and by lessening the water very considerably we wonderfully increased the duty. I consider this a most important point, and persons adopting these stamps will do well to bear it in mind. To name the quantity of water would be useless, as that must doubtless vary in different mines, according to the character of the stuff and the grates used.

The materials worn out in the reduction of the 2000 tons 15 cwts. of tinstone, and their cost were:—

	Cwts.	qrs.	lbs.			
12 stamp heads or shoes, weighing	28	1	14			
6 stamp dies, weighing	10	2	21			
Total	39	0	7	at 7s.=	£13	13 6
14 copper grates				at 10s.	7	0 0
Total					£20	13 6
Deduct value of old iron	16	0	0	at 3s.	2	8 0
Total cost					£18	5 6

Or barely 2¼d. per ton of stuff stamped.

I may here explain that 20 cwts. to the ton was the standard of results obtained in the trial reported in Mr. Loam's paper.

On Oct. 16 I instituted another severe 24 hours' trial, with a result of 86 tons 16 cwts. of 20 cwts. per ton, or 7 tons less than the results from the former trial. This falling off I account for by the grates being nearly all new, and also from the heads and dies being worn much below an average condition. This I regard as a trial of the stamps under disadvantageous conditions.

The question of coal consumption is not accurately determined, our boilers not being in proper order. Mr. Loam is arranging for a crucial test, the result of which will be published. I think that 3½ tons per day will be found about the quantity consumed.

Next comes the question of durability and the maintenance of the various parts, other than those before referred to;—

	£		
A pneumatic cylinder, bored and turned, costs	6	5	0
Steel pin in ditto		1 16	9
Steel piston and rod		4 4	0
6 9½ in. steel spring rings		1 1	0
3 3 in. ditto		0 7	6
2 cast-iron planed V guides		3 17	0
2 steel angle guides		5 0	0
3 pair cast-iron bearings for plummer blocks of crank-shaft		1 2	6
3 sets of white metal bearings for ditto		6 15	0
2 pair brasses for connecting rod, lined with white metal		8 15	0
Total	£39	3	9

The whole of the wearing parts are comprised in this list, the remainder of the machinery consisting of massive and imperishable castings and shafting. An outlay of 39*l.* 3s. 9d. will, therefore, practically provide a new one head battery—or, in other words, when our four heads here are completely worn out they may be replaced by an expenditure of 156*l.* 5s. The period when this will become necessary is evidently remote, as by merely re-planing the guider, re-boring the cylinders, and supplying new piston rings at comparatively little cost the whole will be virtually renewed.

On Sept. 29 the stamps were taken abroad and carefully examined, and the only wear that could be detected was the mere removal of the burr or traces of the fitting shop. An iron wire, 9½ in. long, would hang suspended across the middle of the pneumatic cylinder, that being their exact diameter at the outset. The fineness of the coffer grates used indicates the nature of our tin, which is exceptionally fine in the grain. We stamp direct into the buddles, and the separation is excellent; the tails of the first or stamp buddle unworthy of further treatment are sent direct to the burrows.

These are authentic facts of a conclusive nature, requiring no further comment from me. I may say, however, in conclusion, that it will afford me the greatest possible pleasure to receive the visits of members or others desirous of seeing the stamps at work, and to answer enquiries upon the subject.

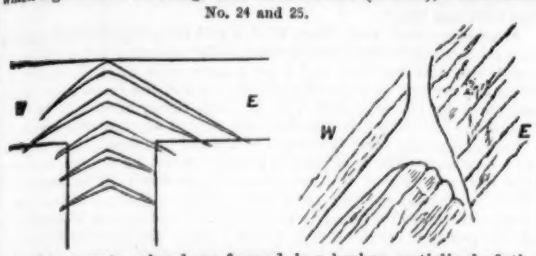
Original Correspondence.

THE GOLDEN QUARTZ REEFS OF AUSTRALIA.—No. VIII.

SIR,—Since forwarding my last contribution on the above subject the Garden Gully United Quartz Mining Company has declared a dividend (the 246th) of 1s. per share. The slides or faults in the Garden Gully reefs conform in their dip north with that of the saddles of the reefs, and the saddles of the reefs, whether broken or of the true crescent form, with the dip of the corrugation of the strata in which they exist; and as I have previously stated, the branch veins run parallel with the north dipping, nearly horizontal joints in the strata or parallel with the nearly vertical joints, in both of which kinds of joints these branch veins appear to have formed. Here, then, there is more uniformity or law and order in the structure of these reefs and veins than the disciples of the "Where it is there it is" school are willing to admit of the existence of in the lodes and veins traversing the strata or rocks beneath the surface of the earth. Law and order may prevail in every other part of the universe; but these men draw the line at lodes and veins. Lodes and veins exist in disorder, and chance reigns in them supreme, these disciples would have us believe, yet they recognise the great Creator, "who saw everything that he had made, and behold it was very good."

Reefs and Veins.—At the north end of the Garden Gully reef, in a cross-cut and winze at nearly 1000 ft. in depth, occur veins of which I give the following instructive section (No. 24), which illus-

No. 24 and 25.



trates how quartz veins have formed in a broken anticlinal of the strata, which consisted of hard dark blue slate. I might ask how did these quartz veins, formed like a series of double wedges, manage to insinuate themselves in this manner between the slate, and also supposing, like Topsy, they grew there, might they not in the fulness of time have formed one extended inverted V (Λ saddle reef), with proportional east and west legs to the size of the saddle. But I do not ask these questions. I merely suggest them. I will, however, remark that there is exhibited in these veins a marked degree of uniformity in their mode of occurrence, which chimes in appropriately with what I have said at the beginning of this chapter. These five veins of quartz are isolated from each other by hard blue slate, not unlike roofing slate, which it is well known water cannot readily penetrate, nor could there be any other water connection between them than that due to the limited "sap" water in the rock, excepting through the thin joints, and possibly the break in the apex of the strata. Under these circumstances the five isolated veins in hard rock cannot be said to exist under those very congenial conditions requisite for rapid growth or extension. Had their career not been cut short by man, they might have had to wait a long time before a convenient earth tremor or quake would grant them additional space, or a fracture or slide to afford them improved water connection with their more favourably situated neighbours.

Tasmania to the south of us has been for the last six or more months in a constant state of tremor and shake. The inhabitants of that favoured region do not appear to appreciate the full benefits; such a gentle shaking up of the rocks of their island may be conferring on the growing gold and tin lodes imprisoned in hard uncongenial rocks far below the surface. Such words may be read with a smile, yet I dare to say that no one will deny that earthquakes, big or small, serve some good purposes in the operations of Nature. I conceive that all quakes, big and small, are necessary (evils if you so like to call them) adjuncts to the production of metallic veins in abundance. No doubt they occur in their proper seasons, and our time has not yet arrived on the mainland of Australia for more than an occasional tremor. But in the past all East and South-Eastern Australia must have been shaken up very severely at more than one period, as our trap and basalt rocks of different ages indicate beyond doubt. Tasmania, too, has been thus patronised in the past, and is now receiving more than her fair share of earthquake attentions.

Proceeding still further north on the Garden Gully line of reef we arrive at a point where the name of the reef changes, and becomes known as the Perseverance and then the Windmill Hill. The Koch's Pioneer Company is situated where the overlap of the Perseverance and Garden Gully takes place. This company possesses a crushing plant which comprised 96 stamp heads, 70 of which are for the most engaged in crushing for the public. The main shaft in this mine has attained 1450 ft. in depth; but the Garden Gully reefs about here have not been prolific of gold. At the present time the principal operations are confined to works at shallow depths. The lava dyke, however, is proved to continue to the greatest depths, and in certain parts I have examined the quartz in the reef quite close to where the lava has cut through it, and the quartz certainly presented the appearance of an approach to vitrification. One of my old students spent 12 months at this mine obtaining practical mining experience under the then manager, Mr. J. A. Lewis. At my request the former gave me a description of the character of the reefs in this mine, obtained from his own observations and notes, and I now quote a few of his (Mr. Marco Guerin's, C. and M.E.) remarks, and give his illustration. This reef (Fig. No. 25) occurs at about 350 ft. below the surface. As shown in the diagram, one leg, the western, runs approximately parallel to the stratification of the country, while the other cuts across it, the footwall showing the ends of the strata in a series of roughly defined steps, which contrast rather markedly with the more regular footwall of the western leg. . . . All saddle-formed reefs agree in the regularity of their hanging-walls, and in the increasing regularity and parallelism, as a rule, of their laminations as we sink from the "cap" upon either leg. In the "cap" or saddle the dark quartz and slaty lamine are nearly as irregular as the veins in marble, while in the legs they run parallel to the regular hanging-wall. There is considerable discrepancy as to magnitude between the two legs of a saddle-formed reef, as shown in the figure. The west leg is better developed than the eastern, which pinches out pretty rapidly. The legs occasionally vary greatly as to the value of their gold contents. . . . The "cap" of a saddle-formed reef usually has a well-defined dip; one in ten is approximately that of the Garden Gully reef in the northern part of its course.

From what I have stated and from the diagrams it must be evident that as we proceed further north the saddle-formed reefs have been left behind so far as actual work in them is concerned. The continuations of them have no doubt with their northerly dip gone down in that direction to vast depths. Their existence downwards will in a great measure, however, depend on the continuance in that direction of the same congenial strata as those with which they were associated in the rich mines to the south, which I have already more or less described. Should the beds of black slate thin out or gradually change into gritty slate, and then into coarse-grained sandstone, and this latter rock be found to generally prevail, then probably the reefs will be found to have undergone a change also into large barren reefs, or into what are usually termed irregular vein formations. It is just as possible, however, that the black slate beds and general character of the whole of the strata might improve in those qualities requisite for the production of auriferous reefs.

In our progress north we pass from one zone of strata into another as each one successively dips below the surface. Between the Windmill Hill and the Garden Gully reefs proper there exists no continuous link of quartz reef connection. What mining has been done is mostly on what is called the Perseverance reef, which is off the true line to the west of the Garden Gully reef, yet it must be included in this anticlinal formation. Several private mines hereabouts have yielded a considerable quantity of gold; but no mining works have so far been carried out on an extensive scale, and it is only when the top of the Windmill Hill is reached that we appear once more to have got again into an auriferous zone of a magnitude worthy of place and notice on this great line of quartz reefs.

The Windmill Hill presents the usual bold declivity to the south as compared with its fall to the north, which is characteristic of the whole of the prominent hills on each line of reef, as is illustrated in the first diagram supplied in connection with these notes of mine on quartz reefs. In the pioneer times on this hill Scotchmen were prominent claimholders, and all of them and men of other nationalities who were interested in claims on the northern slope of this hill made their fortunes, or to use diggers' phraseology their "piles." The miners of Windmill Hill could count amongst them some of the biggest men on Bendigo, and their hearts were in full proportion to their bodies. They held a central position as regards the quartz mines of Bendigo, and they were worthy of the pivot. From their elevation on this high ground they could see the greater part of this gold field spread out around them. At first the scene was a monotonous one of tree tops, like a dark sea surrounding them on all sides, but gradually that forest was swept off the land for 20 miles around, to supply the ever-increasing demands of householders and mines and miners. At the present time there are no less than 260 steam-engines, of 6426-horse power, engaged in connection with mining alone, and 1391 stamp-heads reduce the bodies and limbs of the quartz reefs rapidly to dust. The contour of the whole of the country is laid too bare to the gaze of man and the blaze of the sun. As all vegetation was swept away the dust fiend took almost daily possession of the land, and enveloped the land and the inhabitants in its folds. The sun on a clear day would be obscured, and those persons whose occupation necessitated their moving around the gold field must have had indelibly fixed in their memories the peculiar sensations of being engulfed in a dense and mighty whirling pillar of coffee-coloured dust. I do not think it will require a very great stretch of the imagination to understand the feelings of a clean white man, got up in light attire suitable for a hot summer's day, after he has emerged into broad daylight from the dusky embraces of one of these foul monsters, a dry mud besmirched choking wretch, with eyes full, ears full, nostrils full, hair and beard, and moustache and mouth, and throat and pockets, &c., full of dust. Diggers are not averse to dust of the right sort, but under these circumstances a lone man may survey the visible portion of himself through grit tear-filled eyes, amidst impulsive and perhaps harsh language, with some excuse. The boot is on the other leg, and he might choke with laughter, could he open his eyes for a minutes inspection of a mate's begrimed face. The hot north wind brick fielders and the whirlwinds of dust are not now nearly so bad as they were. The field is nearly surrounded by cultivated land, and the city of Sandhurst streets are lined with scores of miles of beautiful trees, and the dust storms are somewhat modified; but in many parts of the gold field the gullies or valleys are being rapidly filled up by immense mounds of quartz tailings, and on a windy day the sand from these is blown in clouds across the country. All such tailings heaps should be run into the excavations made in the mines below the surface, where it makes the best of "filling," and is prevented from becoming a nuisance to the inhabitants, and from covering up valuable land. When this is done there will not be any need to christen the city of Sandhurst the city of "Sand-dust."—*Melbourne, Sept.* 18.

WM. NICHOLAS, F.G.S.,
Consulting Mining Engineer.

AKANKOO GOLD COMPANY

SIR,—It is admitted that the board have expended all the capital of this company except 3500*l.*, and Mr. Maurice Grant has at last taken fright, and has issued a notice requiring the directors to convene a meeting to bring about their own "happy despatch," excepting Mr. Wyatt, who is sought to be retained on what appears to be insufficient grounds. For what concerns Mr. Wyatt I think most will agree with the views of the directors, which they put forth in their circular in reply to Mr. Grant, and had they rested their case there and also undertaken not to re-engage the late manager their retention might possibly have received some support; but they have gone further, and insinuated ungracious motives, so easy to make, so difficult to refute, that I should imagine even their immediate friends cannot approve. I make two extracts from their circular of Oct. 30—"Possibly our manager out there might have made a selection of ore showing visible gold for crushing, and by that means presented an apparent result, which would have inflated temporarily the value of shares; but such treatment would not, in our opinion, have been either honest or in the real interests of the company." . . . . "It is again a matter for the shareholders to consider how far they desire the property to be managed by those most largely interested in vendors' shares."

These remarks appear to have arisen from the fact that Mr. Grant advocated a wise selection of ore for crushing into first and second class ores, and a selection from 3000 tons of quartz stated by the late manager to be at grass, so as to contribute in some measure towards paying for the future exploitation. As to reasons assigned why Mr. Grant and others of the vendors—who by the way subscribed very largely for ordinary shares on their issue—are untrustworthy, I fail to conceive their potency, particularly as Mr. Grant has hitherto zealously supported the board, and having been by his support a means of retaining them (aided by Mr. Wyatt) so long in office. With the capital all but gone and no practical developement of the mine, which has not yet even been prospected, Mr. Grant seeks very late in the day (as promoter of the company) to stand by the shareholders and avert the pending imminent ruin of the company; and being possessed of a number of free shares and also interests in adjoining properties, worthless if this fail, it is not likely that he will be less zealous in his exertions in our behalf on that account. It therefore appears very desirable at this critical juncture to accord him the support asked for and make him the Chairman of the company, rather than continue the present Chairman at a very large salary. With one more extract from the directors' circular, and which puts the matters at issue in a nutshell, I conclude my letter, thanking you in anticipation for the insertion of it in your Journal. The further extract is as follows:—"Our contention is—That the mine has so far been efficiently and properly developed." How say the shareholders?—*Queen Victoria-street, Nov.* 5.

A. S. G.

GOLD COAST MINING COMPANY, WASSAU.

SIR,—To the end of the financial year 1883 we were in anticipation of fair results being achieved by the development of the mine as soon as the new machinery was put up, it being given out from the chair at the statutory meeting of 1883 that the estimated output per day would be about 25 tons of ore, and value of the gold extracted would be about 4500*l.* per month, or 27,000*l.* for six months. Now, let us compare the revenue account for the first six months of the present year (1884), which is given thus: 1805*l.* 16s. 2d.; deduct this amount from the above and the loss will be 25,194*l.* 3s. 10d. for six months. While looking over expenditure I find it stated in 1883—salaries, payments to agents at Axim, including the native labour, will from this time amount to 420*l.* per month; but, referring to the circular issued in August, 1884, the average expenditure for mine working account is given at 625*l.* per month. At the general meeting of 1884 I find that an amount of 4922*l.* 0s. 8d. is carried over as an asset, whereas it is money expended, not in machinery, but in labour cost on the mine. The item of Messrs. F. and A. Swanzy for agency accounts (3598*l.* 3s. 6d.) is mentioned purely as a business matter; but it is important to know that these gentlemen hold a third of the shares fully paid up in these mines. Therefore, if a charge is made for short loans on account of the mine at 2*l.* per cent., or 30*l.* per cent. per annum, it would have been but fair to have deducted a third from that amount as being due from them as shareholders to the mines account. In Cornwall, where vendors had participated so largely in money and shares in the starting of the new concern, it would be considered sharp practice.

The statement made by the Chairman—"The lode has been taken out about 46 fms. lineally," not being a mining phrase, I candidly admit I do not understand it. Why the estimate given for raising and crushing the ore per day here is 15 tons, and in the preceding meeting is 25 tons, will require reference hereafter. A remark occurs—"that we are working but one mine out of the three," but I find stated elsewhere that Mr. Crocker was entrusted with the management as being thoroughly acquainted with the property. Has he, therefore, been sinking shafts, erecting stamps, &c., at Crockersville and Sam's reef, and then closing them up again. If this is true, the sooner the shareholders put a stop to this expensive meddling the better, otherwise the money will be expended in folly and improvidence. It is quite true that the yield of gold varies somewhat in the stuff, hence at one time we have over 5 ozs.; at another, 3 ozs., 2 ozs. 7½ dwts., &c., but it is a dangerous precedent for Mr. Lewis, or anybody else, to fix the produce at 1 oz. or 1½ oz. per ton. This can only be decided by frequent assays at the mine, and by competent authorities at home. Experience all over the world has proved the deeper we go in a mine with a lode the richer it becomes with its yield of metal in quantity and quality (not even excepting gold). If then, 1 oz. or 1½ oz. is extracted from an average yield of 2 ozs. to the ton, which amount has been asserted to be the average by prospectus, and also from the chair at the meetings of 1872 and 1873 a lack of efficiency is shown on the part of somebody immediately concerned in the reduction of the metal. I am aware that gold in such purity is very ductile, hence particles beaten out so thin float in the water, but although it offers difficulties in recovering, yet there are known methods for dealing with it efficiently. In last week's Journal Dr. Rowland J. Atcherly, adds yet another to the several known plans. It has struck me that filter beds of coarsely powdered wood, charcoal, might be used to deal with this difficulty. After passing the charged water by a slow current and by filtering for some time, the charcoal, slime, &c., might be dried by the sun, calcined in a reverberatory furnace, and dealt with afterwards with quicksilver, &c., or sent home to be dealt with efficiently by competent authorities, and the perlash salt utilised as a by-product.

Mr. Lewis at this meeting informs us that the efficient officers have informed them that they may look for 10 to 15 tons of stuff a day now that the new machinery is at work. I, for one, take an exception to the word efficiency, but forbear for the present from saying anything further.—*Helston, Nov.* 4.

N. R. H.

ENGLISH INVESTMENTS IN COLORADO.

THE RICH MINES OF OURAY—HIGH-GRADE MINERAL FROM THE ELDORADO.

SIR,—Inasmuch as a great deal of English capital has been and is about being invested in Ouray and other counties comprising the rich mining districts of the San Juan country, the following interesting article, which appeared in the Denver Tribune of this morning, cannot but be of interest to the many readers of the *Mining Journal*.

The famous Mount Sneffles Mining District is maintaining its well-earned reputation, and is shipping large quantities of ores, besides preparing for an increased output for next year. The Virginius is one of the steady producing and paying mines, and the owners are encouraged to find the ore improving in value as depth is gained. Some of the finest ore yet discovered has been found in the fourth level. The output of this property will not, however, be materially increased until the railroad is extended to Ouray, which we understand will occur sometime during next year, the contract having already been let to responsible parties. The Monongahela, which joins the Virginius, is being worked steadily, aad producing excellent ore.

The Terrible still remains idle, from some reason unknown, although its past record has been a brilliant one. This would be an excellent property for capitalists desiring a developed mine that would pay continuously. The Sidney, on the same vein with the latter, has been a steady producer, and will continue to ship ore until snow prevents. The Monarch is situated on the same vein, between the Sidney and Terrible, and has come into notice for the first time this season. It has been leased by one of the owners, who will have it in shape to ship a large amount of ore next summer.

The Eldorado is another fine property that has been recently bonded to the representative of an English syndicate. It is one of the rare properties that has more than paid all deadwork from the grass roots. It is more favourably located for working than most mines, being below timber line, near a good wagon road, and possessing an excellent water power. It has been developed by three levels and a shaft, with room for two more levels. The average value of all the ore shipped is $500 per ton. One of the owners showed us some fine ruby and brittle silver ore, taken out while doing his assessment work last month, which gave the following excellent returns in gold and silver:—$751, $534, $763, $1151, and $1549 per ton, averaging $950. The Mears wagon road has been completed to a point near all of the above-mentioned mines, and rates of transportation have dropped to $8·50 per ton to the railroad and Montrose, a saving of nearly $30 per ton four years ago.

In Imogene Basin, a syndicate of English capitalists has completed the purchase of the Declaration and Agnes lodes, erected substantial buildings, and commenced the building of concentrating works. Judging from the amount of ore that we saw two years ago in the upper level of the Declaration, there is but little doubt that the investment will prove a profitable one. Our English friends are, as a rule, excellent judges of mining properties, engage in mining in a more systematic business-like way, and are content with reasonable profits. While Americans, with few exceptions, are reluctant to put up the necesary money to do scientific mining, and growl if they cannot receive their entire investment back in two or three years.

The Allied Mines, so called, remain idle, pending the clearing of titles. It was reported some time ago that a company had been formed in England to work these fine properties, but we understand the delay is caused by the slow process of securing satisfactory settlements with the creditors of the old outfit. Since these mines were developed, and put in shape for production labour, supplies, and transportation have cheapened from 20 to 50 per cent., and with a capacity of turning out 100 tons per day there are handsome profits awaiting the corporation that will rightly work the Allied.

The Hancock is a good property, showing a large body of ore that runs from 50 to 80 per cent. in lead and from 20 to 50 ozs. in silver.

The Chicago and Bangor are new and promising properties, showing large bodies of lead and copper ore for several hundred feet on the surface. If the theory is correct that these claims are on the Terrible vein they might become shipping mines with little more development. We have mentioned but a few of the prominent mines of this district, but will refer to others in a future article.

Denver, Colorado, Oct. 18.

OCCASIONAL.

GOLD MINING IN NORWAY.

SIR,—The most important event of the last month has been the starting of the Oscar Gold Mining Company's mill. You have most likely already published an account of it from the pen of some of the company, but knowing there are many who like to get a few lines from an independent outsider, I shall give my opinion from my point of view. It was started on Oct. 14, but all the belts had to be tightened up again before anything could be done. Next day it went off all right, except the water supply and steam seemed to be limited, the supply pipes and bad coal, I think, being the cause. Both of these faults can be remedied without any great difficulty or expense, in the meantime from one or both of these causes they are only running one battery of 10 stamps, instead of 20. The mill has been very much hurried forward under great difficulty and incessant rain, their water supply is abundant, but the main is too small, I think, and now it has started long may it run and give dividends to the shareholders and employment to the inhabitants; they are both needed just now. There was a dinner given by the company to the men employed, engineers, and surrounding claimowners, there were about 200 persons present, but would have been many more had it not been too stormy to land by boat. Northerly gales with heavy rain prevented the steamer Rap from arriving with the company from the town of Haugesund, and it seemed on the morning of Oct. 16 as if we were going to have the play of Hamlet without Hamlet or any of the principal characters, as Mr. John Daw, jun., manager, with his father, mother, wife, and brother were all at Vorness, several miles away, and no way of reaching the mine only by facing the storm and tramping it across the rocks and swamps,

which they did so as not to disappoint their guests. The dinner was not got up in any grand style, but they all had good appetites which is better than Lea and Perrins, or any other sauce yet invented, and they did more than go through the ceremony of eating a dinner. There was a great deal of toasts and speeches, in which Mr. Smith was not backward, but proved himself quite a grand old man in his own way, and the directors health and everybody else's was drunk, with three cheers for Mr. John Daw, the manager, and so ended the first chapter, or act the first. There are a few small local companies working away in rain and snow, but there will not be much more done on the surface until the spring, when we hope to see at least another London company at work on the Haugesund company's property. There are several figurings on the purches of this property, and several times large sums have been refused for it lately, but the present owners have not got the means to erect a mill, and must come to terms with capitalists before they can get the gold out of their heaps of quartz and slate. If the Oscar proves a success in the meantime there will not be much difficulty in getting capital, but after the money that has been spent on it, if not proved to have payable ore, there will be mill enough to crush for surrounding claims that may find enough to pay. The Oscar is not looked on as the best ground about here by some, but time will tell with the aid of stamp mills that proves better than all the experts what a mine is worth, that will be act the second, and the public will then judge if it is a farce, tragedy, or to what class it belongs, but I do not think they will shut down for years nor yet get 15 ozs. per ton. If they get ½ oz. to the ton with the present size of the lode they will give good dividends, and the chances are they will get something between the two; I think they started on their worst stuff first. The winter here will not prevent those claims working who have got their shafts sufficiently deep to keep a roof over them, but it is rough on miners out on the surface lately. Umbrellas are not much use here. The Haugesund Company have decided not to get out any more quartz yet till something is decided about a crushing mill, believing rich specimens are as safe in the ground as they are on the quartz heap during the heavy rains. I have visited a great many surrounding islands and mining localities where they claim to have found gold, but failed to find any, and consider the samples shown me a very bad match compared with bulk of the stock of quartz on the dump, and I fancy there must be some mistake, and that it is not quite safe to buy claims from samples without visiting them first, not even amongst a simple people like the Norwegians, but it was done here in more than one case, but I do not think it quite safe. I did find gold in one place to the north in the claims of Mr. Jorgarsans, of Heskin, but only in small quantities. I am often asked a question here that I feel obliged to confess I do not know—that is, when they show me quartz, slate, galena, and calcspar all combined, and say why should there not be gold there as well as in other parts where it is already found? After a long experience of gold mining and reading the articles on fissure veins, &c., in the *Mining Journal*, and other reports, I am quite ignorant of how the gold ever got in the said veins, or why it is absent in others where the indications are all present; as far as I can see this will be one of the problems for them to solve in the next century. In the meantime I take it when I can find it and ask only from what part of the claim it came. This is a good place for students to study geology, the country being so rocky and bare the diorite dykes are easily traced in different directions often running with the quartz veins, some crossing and throwing them hundreds of feet out of line. If the gold yield proves payable this is likely to be a favourite place in the next summer with this class of visitors and colonials from Australia, who still take an interest in these matters. JOSEPH BADDELEY.

Haugesund, Bömmel Island, Oct. 28.

GOLD EXTRACTION.

SIR,—An article headed "Gold Extraction," which is mainly devoted to the description of a process [fully referred to in last week's *Mining Journal*], which Mr. Jordan claims to have invented and worked out to a practical success, appeared in the Times of Oct. 31. Your sense of justice will, I feel sure, cause you to insert the following few remarks which I have to make on this subject. The Times claims for Mr. Jordan four "novel principles or conditions of treatment which combine to secure the extraction of the gold from the most refractory mineral combination without the application of fire." The four novel principles are stated to be these —1. The ore is reduced and the gold amalgamated while in a perfectly dry condition.—2. It is reduced by impact, and not by abrasion. —3. The ore in this finely divided, clean, and dry condition is subjected to the action of mercury under considerable pressure, and under the constant action of mechanism, which continually separates the particles.—4. The entire process is automatic from first to last, this automaticity being obtained by means of air currents which are utilised for the separation, delivery, and conveyance of the powdered ore from one point to another, instead of sieves, water, and labour.

I affirm, and am prepared to prove, that Mr. Jordan cannot substantiate any one of these claims for] novelty, and as for a patent taken to protect the combination, practical men would snap their fingers at it, and rightly. I am informed from Melbourne that the Government of Victoria had refused to grant Mr. Jordan a patent for his process, their grounds for refusing being "want of novelty." In England hitherto there has been no difficulty in getting a patent for anything. It is to be hoped the new Act will gradually mend this state of things. There are many besides myself who would dispute Mr. Jordan's claims. I will, however, confine my remarks to a few facts with which I have been personally concerned. More than two years ago, backed by an influential syndicate interested in the subject, and having as a colleague Mr. Walter Koch, I commenced operations on a working scale to test the practicability of using molten lead instead of mercury as an amalgamating medium for the treatment of particular kinds of ore.

For the purpose of these trials we rented works near Towcester, in Northamptonshire, originally erected by the late Sir William Siemens. The principal difficulty experienced was in devising a machine which would enable us to introduce the ore beneath a column of the molten lead. This difficulty was at last satisfactorily got over, and we decided to relinquish the works which we had held for eight months, and to put our plant in a more getable position near London. Whilst, however, perfecting the machine for the lead process, it became apparent that the machine embodied the very conditions which would render it specially suited for the treatment of auriferous pyrites, or ore containing "float gold." Accordingly, before leaving the works, we arranged a machine to work with mercury, and began by treating the ore in the condition of a dry powder—in fact, in the same condition as we had been using it in the lead process. We experienced no difficulty in passing the dry ore through the mercury, and have since treated many ores in that way. I have, however, so far, preferred to pass the ore through the mercury in suspension in water for the following reasons:—Because at present it is the universal practice to wet stamp gold ores, and no dry crushing machine (Mr. Jordan's included) has yet been invented which is suited to the requirements of a gold mine. Machines of the type of Mr. Jordan's —the principle is very old and well known—do wonders at a demonstration of an hour or two; they reduce the ore to an impalpable powder, but they very soon cut themselves to pieces. Their life is a short and a merry one, and, as such lives are apt to be, very expensive. The amount of power they consume in merely beating the air to no purpose is enormous. An additional, and, in itself, sufficient reason for the course I have taken is to be found in the fact that out of the many ores I have treated, both wet and dry, not one gave better results when treated dry than it did when treated wet. The simple fact is, that in pyritous gold ores a great part of the gold is in a microscopically fine state of division enclosed in the pyrites, and in order to get it out the two conditions which are absolutely essential and alone necessary, are that the ore should be reduced to a sufficiently fine state of division and brought into intimate contact with the mercury. Perhaps I cannot better illustrate these points than by referring to the only data in your article. The 4 ozs. 18 dwts. ore from Queensland I treated long before Mr. Jordan had anything to do with it. At the mine they were only getting out 53 per cent. of the gold. I treated the ore in the condition it was handed to me—*i.e.*, in the same condition they were treating it at the mine; I, likewise, only got out 53 per cent. I then crushed it finer, so that it would pass mesh having 90 holes to the linear inch; in this condition it yielded up 70 per cent. of the gold. I predicted to the person who brought me the ore that if it were got into a still finer state of division a larger percentage of gold would be extracted; this has been proved to be the case. As regards the Californian gold you mention—which, by the bye, contains nearly all the gold in a visible condition, there being very little pyrites present—the owner showed me the analyses he had made of the tailings after the ore had been treated by Mr. Jordan; they contained more gold than the tailings from some of the same ore which he (the owner) had treated in my machine, passing it through in water, in the condition in which it would be after passing through ordinary stamps, such as are in general use. Further comment is unnecessary when I add that the gentleman in question has erected one of my machines at his mine. So much for Mr. Jordan's first three claims; the fourth is not worth discussing; the existing processes are automatic quite as much as Mr. Jordan's.

I have but one more point to refer to. Mr. Jordan, having had every opportunity afforded him of examining the working of my amalgamator, requested the syndicate owning my patents to grant him the monopoly of manufacturing the machine in this country. This request was not acceded to, whereupon Mr. Jordan informed me that if I would not work with him, I should have to work against him; a threat which did not, and does not, seriously distress me. It is an old saying that "imitation is the sincerest flattery," from which it may be inferred that the flattery will be in direct proportion to the perfection of the imitation. I do not feel much flattered by Mr. Jordan's attentions. Max O' Rell, in his John Bull et ses Filles, has given an admirable definition of flirting—"attentions without intentions." Might I suggest that the converse of this; attentions with intentions would not be an unsuitable definition of flattery. A. K. HUNTINGTON.

Metallurgical Laboratory, King's College, London, Nov. 5.

GOLD EXTRACTION.

SIR,—The attention of the directors of the Gold Ores Dry Reduction Corporation having been called to an article in last week's *Mining Journal* with regard to this company's process, I am instructed on their behalf to request space in the Journal to remove an impression inadvertently conveyed by the article in question, which, if not corrected, would be likely to damage the company's interests. The writer of the article referred to appears to be under the impression that the process is not only the invention, but the property of Mr. T. Rowland Jordan, of the firm of Messrs. Jordan, Son, and Commans. If he had read the Journal of Science, of September last, and had an opportunity of perusing the reports of Prof. Crookes, F.R.S., and Mr. Claudet, assayer to the Bank of England, he could have gathered, what he could hardly have been expected otherwise to know, that Mr. Jordan is neither the sole inventor nor, what is perhaps more important, the proprietor of the invention.

Mr. Jordan is a considerable shareholder in the company, and the firm which he represents are the sole manufacturers to the company of the patented machinery for carrying out the process. He is also the inventor of the "Jordan Pulveriser," which forms an important factor in such process. The complete process is, however, the result of a combination of Mr. Jordan's pulveriser, with the dry amalgamation process, conceived and worked out with his valuable engineering assistance by Mr. W. Pritchard-Morgan and Mr. J. A. Longden, Australian gentlemen representing a syndicate in Queensland, and large mining interests in that colony, and who have been in London for the last two years with the special object of arriving at a solution of the vexed problem of extracting gold from pyrites.

The patents for the entire process, including the "Jordan Pulveriser," for gold and silver have been acquired by this company not only for England but for the world. My object in thus trespassing upon your space is to prevent the possibility of its being supposed that there are two Richmonds in the field—two dry amalgamation processes in existence, and that the horrors of what promises to be a really invaluable invention may be equitably apportioned.

Queen Victoria-street, Nov. 6. R. SANDYS, Sec.

CORNISH MINING.

SIR,—This industry is at present under a cloud, from the very low prices of the principal minerals which this county produces—lead, copper, and tin. Whether or not lead is going to get a rise in price within a reasonable period is difficult for anyone to predict. As to copper and tin, seeing the very great irregularity in the production of these minerals, and the constantly increasing demand for both, it logically follows that in accordance with every other operation in Nature that which is constant is destined to eventually overmatch the intermittent, and that the demand must at length overtake the supply and run to higher prices. We may, and no doubt shall, see many fluctuations, but the ultimate outcome is sure.

Without going into politics, which as mining men we have no intention of making our business, it is very singular that ever since 1852 the Conservative Government have always on leaving office left the price of tin considerably higher than they found it, and the others *vice versa*. Without being able to account for the cause of this in a way that shall be satisfactory to all minds I mention this fact as very interesting. Does it arise from the more manly and reasonable foreign policy of Conservative Governments giving confidence to foreign nations and peace to the people? It looks much like it, for nothing improves trade so much as confidence and peace. If Radicals would confine their agitation to a few things relating to internal policy, which they possibly do understand, and leave high foreign policy alone it might be an advantage in promoting the stability of this Empire and the improvement of trade, which they profess to have so much at heart.

There are so many Members of Parliament who ought to be wearing petticoats, so busy closing public houses in the faces of thirsty people, setting watchmen on dynamite stores, shortening the hours of labour, thereby teaching the young to become a lazy race instead of an industious community as their forefathers were; making laws preventing boys playing pitch and toss, and such like trifles, that they have no time for sensible legislation. Both political parties seem determined that our boys and young men shall never have any chance of learning to shoot; for what can they learn by shooting through measured distances at fixed targets? If all manner of game were declared free and every young man who carried a gun were paid 10s. a year for doing so, instead of having to pay a tax of that amount, they would soon learn to shoot. We should not then be disgraced by seeing our soldiers flying before a few Boers, or our friends burying the British flag in the earth to prevent its being dragged in the mud by such an enemy. We would probably require less jails and more lead.

Very likely the same amount of money which has been wasted in South Africa, and is now being wasted in Egypt and in the Soudan, would suffice to make a railway entirely across the African continent. To do this we should have to retain our annexations and our conquests, thus showing our soldiers that they are really fighting for a sensible object. Thus new countries would be opened up, requiring more metals and men to produce them, and returning to us gold and all the luxurious productions of a tropical country in exchange for many other of our productions besides the Cornish minerals.

But Cornish mining has many enemies from within, as well as from without. When we view the scant encouragement sometimes meted out by the lords, and worse, far worse, than this, when we hear the unjust aspersions cast by this very class on the men who are working heart and soul, night and day, in fairly opening up Cornish mines, thereby benefiting the community, and enriching these owners of the soil, many of whom among their own class affect to hold Cornish mining in contempt. When I say, in spite of all this, we see so many mines at work, and being brought through all difficulties to a grand and profitable issue, it shows fully that this industry never yields, and that it never dies.

It certainly requires a far greater courage, and more confidence, to go into any business at a time of depression than at the time of great and immediate profit. Yet this very depression will make many rich. A small sum judiciously laid out now in a few well-selected Cornish mines will before long, as it often does, return 50 to 100 per cent. or more. Cornish mines have weathered many a storm, and are destined to weather many more.

Redruth, Nov. 4. W. TREGAY, M.E.

THE VAN MINE.

SIR,—Some time since you were good enough to insert a letter from me recommending that this mine should be inspected and reported on by some mining agent before commencing work by the new company. This advice was acted on, Capt. Hodge, of Wheal Grenville, having been called on to do so, and he recommends the sinking of Edwards' shaft down from the 120 to the 150 fathom level, and also the sinking of the sump winze, now down 13 fathoms, under the 120, and within 2 fathoms of the 135, being also sunk to the 150 fathom level before attempting to open out, so as to prove the ore gone down in the bottom of the 120 fathom level cross-cut. This method of working is strongly opposed by a gentleman thoroughly conversant with the Van Mine and all its surroundings, who condemns the sinking of Edwards' shaft altogether until the ore ground referred to has been thoroughly tested and proved beyond a doubt. Where doctors differ I think common sense should prevail. Let us see, then, how matters stand. The manager has stated—"From what he had seen going down, he had no doubt whatever they had a great mine below. His opinion was that they had a greater mine under the shaft than they ever had hitherto, and, referring to the 135, said in three or four weeks he hoped to see what the lode was like."

It appears that both Capt. Hodge and the party I allude to form an excellent opinion of the prospects for opening out a rich mine under the 120 fm. level, and I fully agree with Capt. Williams, and from the reading of Capt. Hodge's report and the remarks on it that such will be the case, and that a much richer mine will be found below the 120 than was found above it, and whether the ore in the winze under that level is the tail of the old bunch of ore or the head of a new one. The best plan to prove it would be to open out in the 135, east and west of the sump winze, now down 13 fathoms under the 120, without wasting time and money in sinking to the 150, as proposed; more particularly so as Capt. Hodge speaks so confidently of the grit rock reaching only to the back of the 120 cross-cut. The The sinking of Edwards' shaft under its present bottom (4 fathoms under the 120) I would leave to the judgment of the manager of the mine until a further decisive opinion was obtained by an independent and unbiassed mine agent, but no consideration should induce me to sink it below the 135 until the new ore ground was thoroughly tested and spoke for itself, and it would then become self-evident whether a new shaft would be required or not.

I would not take away the ore ground in the old mine on tribute, as recommended by Capt. Hodge, as they would not work the ground fairly, but pick out the eyes of the ore everywhere, and might in a lode such as the Van do thousands of pounds worth of damage instead of benefiting the shareholders. And, in conclusion, with the suggestion of getting a committee of shareholders to confer with us to the best means of dealing with the mine I quite agree, and I have no doubt these shareholders who have recently gone into this property at my recommendation will sanction and approve of this course.

Goginan, Aberystwith, Nov. 4. ABSALOM FRANCIS.

ELECTRIC SHOCK FROM A KITCHEN SINK.—A very singular occurrence is reported to have recently taken place at Ithaca, New York, which very forcibly illustrates the dangers attendant upon the universal introduction of electricity. As a lady was turning on the water from the faucet over the sink in her kitchen, using her right hand, her left hand being in contact with the iron lining of the sink, she was suddenly prostrated by a severe shock. Her impression was that she had been stricken with paralysis or apoplexy, but a physician who was summoned found that the inside of the thumb of her left hand had been blistered in several places. This led him to believe that she had received a strong electric shock from some source. A few minutes subsequently the lady's daughter, in drawing water from the same faucet, was similarly affected, though not so severely. The family then became convinced that the trouble existed in the water-pipe and sink. The manager of the Telephone Exchange, after a brief examination of the premises, found the secret of the trouble. The residence was connected with the Ithaca Hotel by a dead private telegraph wire. This wire had been crossed with the electric light wire. The dead wire was connected with the metallic roof on the dwelling house, which in turn was connected by a tin water conductor with the water-pipe leading to the sink. When the dynamo machine of the electric light company was in operation the current passed over the dead wire to the tin roof, and thence to the water-pipe. It needed only the completion of the circuit by some person drawing water to obtain the full benefit of an artificial stroke of lightning.

ELECTRIC LIGHT AT HELL GATE.—The electric lights in the iron tower were put in operation on Oct. 20. The night was somewhat hazy, yet the buildings on Flood Rock and on the Long Island side of the Gate could be seen distinctly, but their angles cast shadows of the most intense blackness. The eddies of the water as the flood-tide swept through the Gate could also be seen as on a bright moonlight night. The light was more diffused and less glaring than those at Madison and Union Squares.

COLUMBIA COLLEGE SCHOOL OF MINES.—Replying to Dr. Raymond's strictures published last week Mr. Arthur S. Dwight says:—Permit me, as a member of the graduating class of the [Columbia College] School of Mines, or, according to your classification, one of "the young ruffians who in a few months will be asking to be put in charge of important interests, involving a knowledge of sciences and laws and men and the rights of person and property," to say that your attack upon the students of the School of Mines is uncalled for and unjust. I do not deny that a silly imitation of college customs is still kept up by a few members in the two lowest classes, who have come to the School of Mines with no very definite purpose, perhaps thinking it, as you say, "a place for class sprees," but these either discover their mistake to their sorrow in the first difficult examination they have to undergo, or have the nonsense knocked out of them by the rigid course of study and training in the succeeding years. Occasionally, during the first two or three weeks of the year, before the routine of hard study has begun, these ambitious spirits work up their enthusiasm, and have what is called a "rush." No man enters but from choice. A few pairs of overhauls are torn perhaps, but no striking is allowed, and nobody's temper is lost. I do not wish to defend the practice of "rushing." It is childish and silly, and the sooner this feeble reflection of college customs dies out in the School of Mines the better. It may save many young men the disappointment and sorrow of finding out from the results of the annual examinations, after they have spent the year in play, that the School of Mines is no kindergarten. That the custom is dying out rapidly is very evident to anyone who has had the chance to observe the successive classes for the past four years. Aside from the "rushing," there is not the slightest trace of "hazing." The first year students and the students of other classes are alike treated courteously. That this slight remnant of "class feeling" in the School of Mines should have been made the object of such scathing rebuke by a prominent technical journal is certainly surprising. The article, it seems, is "called for by the recent events and the present situation of affairs at the School of Mines, where the undergraduates are indulging in tearing one another's clothes, punching one another's ribs, hooting and catcalling," &c. Thus far, I have heard of only two "rushes" in the School of Mines this year, and they were very insignificant affairs compared with the average college "rush," or, indeed, with the average School of Mines "rush" of three or four years ago. Why, then, should we have been made the subject of special criticism, when the students of another technical school may carry their foolhardiness to the extent of having a "rush" on the roof, thereby absolutely endangering life and limb, without any such rebuke from you? With regard to the matter of "cribbing," I admit its existence to some extent in the School of Mines, and the justice of your criticism. In justice to the faculty, let me say that measures have been taken to suppress the evil, but

the students are the only ones who can ever stop this pernicious practice entirely, and it seems to be not generally known that last year, the then third year class, now the graduating class, took the matter up as a body, and did their utmost to drive out the abuse, and with considerable success. If the lower classes would continue the work from where we left it more sweeping results would follow. I do not for a moment suppose that the article was written in any other spirit than an earnest desire to see that the reputation of the School of Mines is not injured in any way, and I admit the grain of truth; but I think that the whole body of undergraduates have not deserved such epithets as "scientific hoodlums," "young ruffians," "cubs," &c., merely on account of the animal spirits and thoughtlessness of a few of the lower class men, nor have we deserved to be compared to a "mob from the slums." At least, the class that graduates next June does not consider that it has given any cause for the remark that "half of them ought to be spanked and put to bed, and the other half clapped into the Tombs."

In referring to this straightforward response, Dr. Raymond says:—Mr. Dwight is quite correct in his recognition of the intention of our article, and the spirit in which he replies, together with the statements of fact which he makes, and which we accept as more trustworthy than those upon which we had previously relied, lead us to believe that the case as represented to us was overdrawn, and that the truth did not call for the exceptional severity of our denunciation. To that extent we modify our sweeping censure. Our views on the subjects of "rushing" and "cribbing" and class feeling in American colleges are not withdrawn, nor is our conviction that these evils are still less justifiable in technical schools.

MINES AND TIMBER IN SWEDEN AND NORWAY.

Notwithstanding the fact that 6,842,998 cubic feet (about 179,030 cubic metres) of coal were produced by Swedish mines in 1882, the demand for British coal still continued on the increase, and amounted to 1,344,000 cubic metres during 1883, exceeding the importation of the previous year by 144,000 cubic metres. The value of agricultural implements, railway rolling stock, &c., imported in 1883, amounted to 8,832,000 kronor, or 490,666*l.*, exceeding the returns of 1882 by 132,000 kronor, and nearly trebling the value of the importation in 1879, which was 3,700,000 kronor, having fallen to that sum from 12,000,000 kronor in 1876, owing to the competition of cheaper Swedish machinery. It is now, however, evident, from the returns that the foreign goods are generally resuming their former position in the market. The trade with Great Britain amounted to about 500,000 kilos., and with Germany to 400,000 kilos. The articles imported from the latter country are of an inferior and cheaper quality to the British, and they also find their way in considerable quantities to Sweden through Denmark, from whence they appear in the returns under imports from that country.

The iron market opened in 1883 with a small demand, and sales were slack until the beginning of March. News from America then brought life into the business, and the trade continued fair throughout the season until September, when the demands again lessened. The iron market may thus be considered to have been pretty firm here all through the year. A feature of the trade has been the total absence of speculation and a scarcity of large contracts, so that the whole production has been absorbed by small orders, leaving no important stocks in the country. There is one description of iron which has been much neglected—hammered bars for the purpose of conversion into crucible steel in Sheffield. With the exception of Dannemora brands, this article has met with little demand, and will probably continue to do so as long as the Swedish Bessemer and Siemens-Martin productions gain ground in England. Prices for ordinary qualities in England have been about 8*l.* 17s. 6d. to 9*l.* 2s. 6d. for rolled and hammered bars, 10*l.* for nail rods and 10*l.* 10s. to 11*l.* 10s. for wire rods, about 8*l.* for Bessemer ingots, and 2*l.* more for Siemens-Martin. Pig iron was well maintained in price all through the year; ordinary brands at about 4*l.*

According to the annual report of the Saw Mills and Timber Exporting Association, the shipping of timber commenced in the early part of May, and continued in most of the ports uninterruptedly until the middle of November. During that time the condition of the rivers was most favourable for floating purposes, and a larger quantity of timber was exported from Swedish ports than in any previous year. The stock of sawn goods this spring will not, however, exceed that of 1883 to any great extent. The quantity of timber, moreover, in the rivers is considerably reduced, and most of the mills will not be able to commence sawing until three weeks after the opening of navigation, which will have the effect of retarding them considerably, and of causing a falling off in the produce of 1884. The total exportation of sawn and planed goods amounted to 748,000 standards, against 715,300 in 1882, and 611,000 in 1881. A comparison of the stocks of Swedish deals and battens at the London Docks in December, 1883, with those of the same date in 1882, shows a decrease of 200,000 deals and 500,000 battens; and in other ports they are not above the average. These facts prove that the Swedish timber trade is on the increase in Great Britain.

Prices were, however, on the other hand, unfavourable for exporters during the past year, showing a falling off of 10s. per standard, and a loss of 6,786,500 kronor, about 377,030*l.*, on the exportation of 748,500 standards. The Association have, therefore, expressed their opinion that, in view of the diminished supply of timber at the saw mills and the increasing consumption abroad, exporters should endeavour to raise the value of their goods this year, and thus obtain a reasonable profit on their invested capital. They are recommended—1, to diminish the felling of trees; 2, to avoid pushing the sales and issuing stock notes until the middle of February; 3, to make their offers of sale only through one permanently appointed agent in each country; and 4, to prohibit the agents circulating printed stock notes indiscriminately to all purchasers. By attending to these rules the Association hope to maintain an even quotation of prices, and enter into a confederation with foreign buyers. The new law which has been enacted regarding the barking of all floating timber has been found most prejudicial to the wood industry of Sweden, and the Association has taken the initiative in addressing a petition to the King, which has been numerously signed by persons interested in the timber trade.

The project for a railroad from Lulea to Ofoten and the iron mines of Lapland is making great progress. The Northern of Europe Railway Company has been formed in London for the purpose of constructing the line from Lulea, in the Gulf of Bothnia, to Ofoten Fjord, in the North Atlantic Ocean, and of opening up the rich stores of mineral wealth in that part of Lapland, and especially in the mines of Kirunavaara, Luosavaara, and Gellivaara. In accordance with the terms of the Royal concession, the company have deposited the sums of money required by the Swedish and Norwegian Governments as a guarantee for the construction of the railway, and they have named two directors for Sweden—Mr. P. von Ehrenheim and Capt. C. G. Bjerta, both gentlemen of high standing in this country, and Lieutenant Lund for Norway. The works were to be commenced at Lulea in the early part of this summer, and there is every probability that one-third of the line on the first section, Lulea-Gellivaara, will be completed before the end of the year, for the country is flat and easily traversed.

In a Swedish pamphlet recently published, "The Luosavaara and Kirunavaara Mineral Beds, and Their Employment by Means of the Ofoten-Lulea Railway," the author has entered into a full and concise statement of the object of the enterprise, and the brilliant results which may be achieved, not only by its commercial success, but also in opening up and peopling the northern provinces of Sweden, which now consist principally of waste lands, and are almost uninhabited. He states that the province of Norrbotten, in Lapland, contains 105,000 square kiloms. of the 443,000 which form the whole of Sweden—that is to say, a fourth of the kingdom—but its population amounts to only 92,000, or not quite one man per square kilometre; nevertheless, Norrbotten is really Sweden's richest province, but its wealth has remained slumbering for thousands of years, and its iron ore beds contain such unheard-of treasures that they could not be "surpassed anywhere either in quality or magnitude." According to the researches of scientific and impartial persons the value of Norrbotten's mineral riches must be computed at "milliards." Lapland's future prosperity depends, therefore, entirely upon its underground wealth. The working of the mines on a large scale, and the production of the ore in the markets of the world will necessarily call to life other industries. Amongst these, dairy farming is especially referred to by the author; and as a proof that the country is not rendered uninhabitable by the climate, he points out that the whole length of the River Tornea is now populated, and that the real and only drawback to the colonisation of the interior is not the climate, but the lack of communication with other parts of Sweden.

The railroad which is now about to be constructed will open a new era in Lapland's history. In four or five years the inexhaustible mines will be provided with easy and cheap conveyance for their produce to both foreign and Swedish markets, and the colonisation of these immense tracts of country will be rapidly increased, and even doubled. The pamphlet further describes the iron ore beds of Kirunavaara and Luosavaara:—Kirunavaara (Ptarmigan Mountain) is nearly half a mile long. In calculating its mineral wealth the author has divided the ore into three sections—1, that which lies on the highest ridges and crest of the mountain; 2, the ore lying between these points and the surface of the lake Luosajärvi; 3, the ore lying beneath the level of the said lake. The first section is estimated to contain 2,027,000,000 centners, the second over 4,102,000,000 centners, and the third 10,580,000 centners for every foot in depth, but it is impossible to state how deep the ore extends. Luosavaara (Salmon Mountain) lies almost due north of Kirunavaara. It is nearly conical, and has only one peak. Its mineral wealth is calculated at 650,763,000 centners above the surface of the lake, and 1,677,000 centners for every foot in depth from that level.

In support of his allegations as to the magnitude and fine quality of the mineral beds, the author states that they are founded on the official reports furnished by the Geological Commission appointed by the Swedish Government on May 21, 1875, to survey the iron ore beds in the interior of Norrbotten, which was composed of the following persons:—David Hummel, geologist; Otto Joel Gummelius, mining engineer; Carl Axel Dellvik, metallurgist; Capt. W. G. Bergman, R.A., instructor in topography at the Royal Military College; Otto Robert Hederström, surveyor of forests; and Abraham Oscar Trysen, mine inspector. Out of 23 specimens of ore from Kirunavaara, 12 were found to contain between 70 to 73·5 per cent. pure iron, 13 between 65 and 70 per cent., and only three were of lower quality. The poorest specimen showed 61·5 per cent., which would be considered of itself a rich ore. Eight specimens from Luosavaara gave the following results:—Five from 70 to 73 per cent. and three between 67·4 and 69 per cent. pure iron. A comparison made by R. Akerman of 632 specimens of Swedish iron is also worthy of notice; 298 contained under 50 per cent. pure iron, 149 between 50 and 55 per cent., 109 between 55 and 60 per cent., 45 between 60 and 65 per cent., 15 between 65 and 68 per cent., five between 68 and 70 per cent., and only one, a specimen from Luosavaara, over 70 per cent.

According to the latest official surveys, the Luosavaara and Kirunavaara ores have been found to contain an average of over 70 per cent. pure iron, and only 0·8 phosphorus and 0·65 sulphur, a result, which, the author states, "might be attained, but never superseded in other parts of the globe." The principal difficulties which the railways and mines will have to contend with are the long winters and heavy snowfalls. According, however, to the reports of the Royal Commissioners, it appears that the winter in those regions does not last longer than six months on an average, and owing to the entire absence of thaws during that part of the year, the snowplough could always be used for clearing the line, whilst the large tracts of forest land would also be a protection against snowdrifts. The sides of bare hills and fjells are, therefore, the only places where special provisions will have to be made for guarding the line against snowstorms.

The subjoined extracts from the report of Mr. Dellvik, director of the Geological Institution to the Board of Commerce, shows the views of an impartial authority on the general prospects of the enterprise. He says—"The advantage to be gained by the construction of the railroad, in addition to opening up the mines, can hardly be over-estimated. The most northern parts of the country will acquire daily communication with a harbour free of ice during the whole year, instead of being shut up for six months from all intercourse with the coast. There will then be good reasons for looking forward to the development of the large province of Norrbotten, which includes nearly one quarter of the whole of Sweden's area. Many attempts, dating from olden times, have been made to mine on a large scale in Norrbotten. The climate was not considered a hindrance, and neither capital nor labour were spared, but when the ore had to be conveyed on reindeer sledges, all efforts proved fruitless and were followed by bitter disappointment. In these days, however, we have all the resources to remove the difficulties hitherto contended with, and it is to be hoped that the time is not far distant when the proposed railroad will be made."

After having thus shown that the Lapland Railway is not only possible, but is about to be constructed by a British company; that the iron ore fields of Kirunavaara and Luosavaara contain extraordinarily large quantities of ore above, and probably still vaster amounts beneath the level of the Lake Luosajärvi; and that they are composed of the richest qualities, the pamphlet furnishes a number of details respecting the principal iron-producing countries, with tables comparing the imports, exports, and price of iron ore. A perusal of the figures shows that Sweden at present plays a small part in the iron ore market in comparison with other countries. Owing to the expensive method of making Swedish iron by means of charcoal, the cheaper British metal is gradually forcing the Swedish out of the market. Sufficient capital to compete with the English industry is altogether wanting in Sweden, and there is, moreover, no encouragement for such an enterprise, as there are no means of obtaining coal as a smelting material.

The exportation of the Lapland ore would not influence in the slightest degree the Swedish industry, but would compete especially with the Spanish ore, which is already exported in very large quantities. The author then draws attention to the Gellivaara iron mines, already well known in England, and situated to the east of Jukkasjärvi, and nearly half-way between Lulea and Ofoten, which, he says, will, in a few years, through the construction of the railway, provide valuable material for the Swedish ironworks in Norrland, the Bothnian Gulf, and in the neighbourhood of Gellivaara. The pamphlet concludes with a minute calculation of the probable market value of the ore under the following headings—1, Mining cost; 2, railway freight; 3, loading price at Ofoten. With regard to the cost of blasting the ore, the copy of a document signed by three competent authorities on mines is annexed in the appendix of the book, where they certify that the price will not exceed 3s. 3d. per ton, provided that the mining operations are conducted on a proper system, and adapted to the changes of climate during the year.

The freight from Luosavaara and Kirunavaara to Ofoten Harbour is fixed at 5s. per ton, in accordance with an agreement already made with the railway company, and the cost of loading at 3d. The price of ore free on board at Ofoten is, therefore, estimated by the author at 8s. 6d. per ton, and calculating the freight from thence to a British port at 10s. per ton, the cost of the ore in England is brought up to 18s. 6d. per ton. The writer then enters into a comparison of the above figures with the price of Bilbao ore, and points out that the average price from 1878 to 1882 at a British port was 19s. 6d. for the latter ores, which contain only from 48 to 54 per cent. pure iron, and are, therefore, very inferior in quality to the Lapland ores of Luosavaara and Kirunavaara.

The capital necessary for the formation of a company to work the mines is computed at about 5,000,000 kronor, or 277,778*l.* The owner of the mines is already bound by agreement with the railway contractors to provide them with 20,000 tons of ore per month, or 240,000 tons during the year 1888. The net receipts calculated at 5s. per ton, would, at that rate, amount to 60,000*l.*, and judging by the fact that in 1882 3,737,176 tons of an inferior Spanish ore were exported from Bilbao, of which Great Britain imported 2,900,000 tons, making an increase on the latter country's import of 833,219 tons, the author concludes that the exportation of the superior ores of Lapland will annually increase on a considerable scale, and rise eventually in about 10 years after the opening of the railway to 1,000,000 tons a year.

The demand for metals in 1883 has been inferior to that of the preceding year, and for all makers of usual Swedish products has been unsatisfactory and unremunerative. The improvements made in Great Britain and Germany of late years, whereby the phosphorus in the poorer ores of those countries has been more easily eliminated, have had a bad effect on the demand for the good but expensive Swedish charcoal iron, and a diminution of the requirements for the latter is anticipated by metallurgists here. A reduction in the heavy import duties of the United States would give an impetus to the demand for our products, but this is not expected at present. The most promising branch of the Swedish trade is the production of steel by the Bessemer and other processes. The Sandviken Works, at a short distance from this port, have been very successful, and their produce finds a ready market in Finland, Russia, &c., as well as in Great Britain.

MINING PROGRESS IN NOVA SCOTIA.

The Hall-Anderson Gold Mining Company of the Fifteen-Mile steam district, the stock of which has recently been listed at the Boston, U.S., Mining and Stock Exchange, has a capital stock of $150,000, divided into 150,000 shares of the par value of $1. The company runs 90 claims 150 by 250 ft., 800 acres of wood and timber lands (which is increasing in value daily), 3000-horse water power, a 10-stamp steam mill, hoisting works, large boarding house for miners, saw-mill, superintending house, storehouse, blacksmith shop, magazine and numerous shaft houses, &c. There are five distinct lodes opened and worked of an average width of 3 ft., yielding $18 per ton. The ledges have been thoroughly tested to the depth of about 100 ft. The company is now negociating for the erection of 40 additional stamps and increasing its facilities for mining proportionately. Mr. C. D. Morrison, a well-known mining superintendent of many years standing, has assumed the management of the property. Mr. Morrison says when the additional milling facility is complete the company will pay from 30 to 50 per cent. per annum. There has been $40,000 in bullion taken out of the mine, all of which has been spent in improvements and buying land.

The Oxford Gold Mining Company contemplates soon listing its stock in Boston, U.S. The mines and mill are situated in the Lake Cataba district. The capital stock is $125,000, divided into 125,000 shares, par value, $1 each. The bullion account to date is $100,030, and the amount of cash paid in dividends $36,000. The company owns a 10-stamp mill, and the foundation for 10 more stamps, which will soon be put in. It also owns 61 claims of 150 by 250 ft. each They are mining at present on two different lodes—the Mill lode and the Coleman lode. These lodes are from 1 to 3 ft. thick. The Mill lode has been worked for a distance of 500 ft., and proved nearly 2000 ft., with six shafts sunk, of an average depth of 100 ft., and yielding $48 per ton. The Coleman lode has been worked for a distance of 1150 ft., with shafts at various points along of 100 ft. apart. The average yield is $14 per ton, while the vein is 3½ ft. thick. There are three other lodes upon the property, and in process of development, which will be extensively worked, as soon as the milling capacity is sufficiently increased to take care of the ore. Steam hoisting and pumping works are erected upon five of the above shafts, and completely draining the mines. All of the hoisting and pumping is accomplished by a complete system of wire-rope transmission from the engines and boilers in the main building and extension. Besides the mill building the company has built a large boarding house accommodating 70 miners, blacksmith shop, office, several miners' cottages, magazine, house for superintendent, numerous shaft houses, &c. The plant is without exception the most complete in the province. The first dividend was paid in March, 1883. Up to the present time 12 dividends have been paid (or 12 dividends in 18 months). They expect the next dividend will be paid in November (now earned). The mill and machinery cost $25,000, all paid out of the product, in addition to dividends.

COOPER COAL-LIMING PROCESS.—At the Society of Engineers meeting, on Monday, a paper by Prof. WANKLYN on this process was read. The author commenced by citing a number of analyses of coal, and after entering upon several details he arrived at the conclusion that the coal used in gasworks contained about 1 per cent. of sulphur. He then went on to state that when gas was made part of this sulphur entered into the gas. To rid the gas of the sulphur cost 8d. or 10d. in labour and material, and 8d. or 10d. in interest on plant per ton of coal carbonised, and entailed upon the gasworks the creation of one of the worst nuisances in the whole range of manufacturing industry. Cooper's Coal-Liming process remedied this state of things, and enabled a gasworks to produce pure gas without creating a nuisance, and with considerable advantage. The author then explained the Cooper process, which consists in the addition of about ½ cwt. of quicklime to every ton of coal carbonised. The lime is slaked with its own weight of water, and is mixed with the coal when being charged into the retorts. The exact *modus operandi* of the oxide purifier was described, and an indirect result of coal-liming mentioned. When the coal-liming process is in full operation, as at the Tunbridge Wells Gasworks, the oxide purifier is transformed into a dry scrubber, the function of which is to bring about a combination between traces of oxygen and traces of sulphuretted hydrogen existing in the gas on its entrance into the oxide purifier. Coal-liming, Prof. Wanklyn stated, was singularly free from drawbacks of any kind. The cost of the lime was more than repaid by the extra ammonia. The coke was increased and improved, and the furnace was not injured.

THE STEAM-ENGINE MAKERS' SOCIETY.—The report for the past month just issued by the secretary of the Steam-engine Makers' Society, although it is not of so gloomy a character as a month previously, when there was a largely increasing number of out-of-work members coming upon the books, not only of this, but also of the Amalgamated Society of Engineers, there is no improvement in the condition of trade generally. The branch statements are still of a despondent nature, but there has been no further material increase in the number of unemployed, those in receipt of out-of-work donation being still about 3 per cent. The state of trade in the marine shops is still reported as deplorable, and in many districts does not show much sign of improvement; but in reference to locomotive prices, with the exception of the railway company works, some of these being on short time, they are generally still busily employed throughout the country. Tool makers are also reported to be fairly off for work, but engineering and mill-wright shops vary according to the districts in which they are situated, and, as a rule, they are far from busy or fully engaged.

BELL'S RADIAPHONE.—A correspondent of the Electrical World writing from the Philadelphia Electrical Exhibition, says that included in the Bell telephone exhibits is Professor Bell's radiaphone, a most interesting piece of apparatus. Its function is to transmit speech by means of a ray of light, and without wire. It consists of a flat mirror, properly suspended, by means of which a ray of light is reflected through a cell containing alum water, which absorbs the heat rays to a vibrating diaphragm about 4 ft. distant. The diaphragm is itself a mirror, and reflects the ray back through a suitable lens to a parabolic reflector, in the focus of which is a selenium cell, the terminals of which are connected with a magneto receiver. Now, connected with the back of the mirror diaphragm referred to is a flexible tube, fitted with a mouth-piece. On talking into this tube the mirror diaphragm vibrates, the rays which it reflects through the lens into the parabolic reflector are thereby disturbed and undergo modifications of intensity, these rays are focused upon the selenium cell, and their changes affect the current in the cell in the same way that a vibrating armature affects the induced current around the poles of a permanent magnet. This current from the selenium cell is carried through the back of the reflector to a hand receiver, and, holding this to the ear, the speech is heard. It is said that Professor Bell has conveyed speech 500 ft. in this way by means of a strong ray of light.

MINING IN CUBA

In a report to the United States Department of State, Mr. E. G. SPILSBURY gives some interesting information regarding the mines of Manicaraqua, Cuba. There are at present six mining concessions, all situated in the province of Santa Clara, and distant about 27 miles from the capital of the province, belonging to the Manicaraqua Company. Two are known under the name of the Santa Rosa Mine, two as the San Fernando, one as the Santa Isabella, and one as the San José. These mines have from their appearance been considerably worked in olden times, and large quantities of ore taken away; but the revolutionary wars have not spared them, and all improvements appertaining to them have been burned down or destroyed. All minerals, according to Cuban mining laws, belong to the Crown and not to the owner of the land, who is only indemnified for the damage done to the surface by the prospector. The miner is accordingly facilitated in his operations by the State to the disadvantage of the landowner. The concessions are all of uniform size, being 300 metres long by 200 metres broad. The mining rights only extend down between these vertical lines, but many of these concessions may be taken up by the same discoverer. The mineral deposits are in the metamorphic magnesian rocks. It is difficult to get at the exact age of the formation, but it seems evident that it is subsequent to the cretaceous. The immense overflow of serpentinic and dioritic rocks (spread over nearly the whole of the island) broke through the limestones and slates of the cretaceous period. Later still there seems to have been a second eruption of less magnitude, and the masses of magnesian rocks were displaced by the intrusion of large bodies of a siliceous felspathic porphyry. The serpentine being probably still in a more or less plastic condition yielded but slowly to this intrusion, and was folded so as to give the appearance of regular stratification. These bodies of siliceous matter come but seldom through to the surface, but where they do it is remarkable that they form the crests of some of the highest mountains on the island. The primary mineral deposits invariably occur at the junction of these porphyry deposits with the magnesian rocks. They consist of sulphuret of iron, copper, and zinc. Deposits of great dimensions, consisting chiefly of oxidised ores, such as hematites, oxides of manganese, carbonates, silicates, and oxides of copper also occur in the porphyry deposits themselves. They are probably produced by the action of waters passing through the crevices containing the sulphurised minerals, and partly decomposing these latter. Finding no egress through the beds of serpentine these waters ve percolated through the porphyry beds, and as a large percentage of carbonates of lime and magnesia enter into the composition of the latter the waters have decomposed them, carrying off the lime as a soluble sulphate, and depositing the mineral oxides they formerly held in solution. An example of this is taking place at the mines of San Fernando.

Several large springs, containing sulphates of copper and iron in solution in the proportion of 2 to 3 lbs. of the former and 7 to 8 lbs. of the latter per 100 gallons, flow from the mountain side, but as long as the water flows over the serpentine rocks very little deposition takes place, but at about ¼ mile below the stream crosses a formation of the dolomitic shale, and immediately the precipitation becomes very marked—in fact, so marked and so rapid is this precipitation that a few hundred yards below the water is quite free from copper and iron. These deposits are generally washed away in the rainy season into the Arimao river, where it is not at all improbable large deposits may be found. The primary deposits, however, being in the form of contact veins between two eruptive rocks may be considered as fissure veins, and there is no reason to doubt their continuity and permanence in depth. The extent of the secondary mineral deposits will always be more or less difficult and uncertain, as the pockets will be found to have no regular connection, but, on the other hand, near the surface they are so close that the whole bed may be considered mineral, and worked as such. At San Fernando such was the case, the whole bed being taken for the vein. The old miners had been misled, and consequently most of the old workings run over the tops of the veins, and away from them. Mr. Spilsbury advises that before laying out new work at this property at least two of the old shafts should be cleared, and the water pumped out. He advises the erection of a small hoisting engine and steam-pump, the running in of an adit at as low a level as can be obtained, the erection of concentration works to dress the ores, and the erection of a furnace, as it would never pay to transport low-grade sulphurets at the present rate of freights. In view of this he examined the district round for fuel, and found a very large tract of good woodland, the refusal of which has been secured for the company on easy terms—$1 an acre.

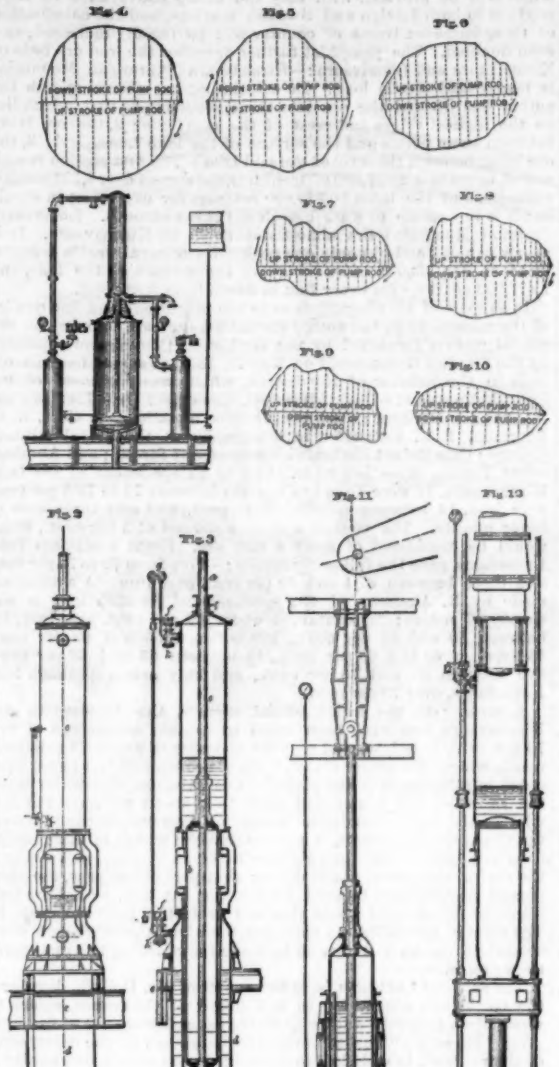
These works would at first be run entirely on the old dump piles of the mines, which contain still very many thousands of tons of good copper ore disseminated through them, and which will pay for concentration. Also all the low-grade ores in the mine, of which there is an enormous quantity, would naturally be treated at these works. To treat the copper held in solution in the springs it would be necessary to enlarge the present arrangement of precipitating by means of scrap-iron. The great objection, however, to this method is the cost of iron. It could not be bought and delivered on the property for less than $55 a ton; and as the precipitate would when procured be not worth much over $200 a ton this tax would be too much. With this in view Mr. Spilsbury has made several experiments to find other cheap precipitants, and has decided that the best and cheapest plan in the long run will be an arrangement by which lime will be used as a precipitant.

ANCIENT METHOD OF WASHING GOLD.—The gypsies of the Banat, in Austro-Hungary, in washing the gold from the sands of the rivers and plains, still use a very antiquated system, out of which, no doubt, the modern systems have grown. It is practised now by the gypsies as it was by the Romans in the same country. It consists in nothing more than pouring the sand, mixed with water over an inclined plane, the heavier particles of the gold remaining upon the surface, while the light impurities are washed away. Sometimes the inclined plane is covered with woollen cloth, to which the gold adheres; wanting the cloth, the gypsies now and then use for the same purpose the more ancient substitute of a fleece. The manner of collecting gold dust on sheep's fleeces, upon inclined planes, is represented in the curious old works of Agricola. In the rivers of Colchis the custom is still retained of placing sheep skins in the beds of the Phasa and other auriferous streams to collect particles of gold; hence the dedication of such fleeces to the gods, and the fabulous history of the Argonauts, as far as it related to the Golden Fleece. The more common manipulation among the gypsies of the Banat, as far as the gold washing is concerned, is performed by means of a plank of lime tree, 6 ft. long and 1½ in. thick. At the upper extremity is a small trough, and across the board are about a dozen grooves or furrows cut in the wood. The plank is set at an angle of 45°. The sand is put into the trough at the upper end, and thence, by plenty of water, washed down the sloping board. The gold dust falls into the grooves, whence it is scraped or brushed off. It might be supposed that a great deal of gold is lost by the careless method, but long experience has made the gypsies very expert; they know how to distinguish the rich and poor sand, and a careful examination of the tailings proves that hardly a particle of gold escapes them during the operation. The gold is in the form of a fine dust, the sand containing it is mixed with black particles of highly magnetic iron, garnets, and mica.

LOCOMOTIVE FURNACE DOOR.—A door has been invented by Mr. H. I. BRABUP, of Elkart, which is so arranged that it is opened by stepping upon a treadle, and is automatically closed by releasing the treadle, so that the fireman need not use his hands to operate it, and it is not left open any longer than is absolutely necessary, thus admitting very little cold air. The door consists of two sections, hung on a common pivot, to each of which is attached a lever, by which a system of toggle-joint links and rods are connected to a rock-shaft, arranged in front of the furnace. The rock-shaft may be placed beneath the floor, and is provided with a foot-piece, and also a hand-lever. By means of a sliding weight upon one of the connecting-rods, which counterbalances the weight of the door, the fireman may adjust the amount of pressure necessary to exert.

POWER REGENERATORS FOR PUMPING-ENGINES.

In 1869, August Bockholtz, then connected with the Austrian railroad service, brought forward an invention based on the idea of utilising the excess of weight of the rods of Cornish mine pumps necessary to lift the pump valves by accumulating the excess of power during the stroke, and using it in the next stroke for lifting the valves. With this object in view Bockholtz constructed an air compressor in which the air is compressed during the stroke, thus accumulating power that during the next stroke aids the steam in its work. He gave the apparatus the name of "power regenerator." Bockholtz's arrangement will be readily understood by reference to Fig. 1. The regenerator cylinder was placed above the steam



cylinder of the pumping-engine. In it moves the regenerator piston connected with the steam cylinder piston by a piston-rod. It alternately compresses the air above and below the regenerator piston. By automatic valves, the upper and the lower parts of the regenerator cylinder are connected both with the atmosphere and with an air receiver, partly filled with water, in order to regulate the pressure of the air. A gauge and a safety valve are also attached to each receiver. When the regenerator piston has reached its lowest position the air below it and in the air receiver is compressed, while the air above it and in the other receiver has only atmospheric pressure. When the piston moves upward the pressure below it will decrease until it has fallen to the atmospheric pressure when the piston has completed its stroke. Meanwhile the air above the piston is compressed. With every change of the stroke the engine is aided by a power dependent upon the pressure of the compressed air and the area of the piston. The highest compression admissible is from 65 to 72 lbs., because otherwise the cylinder and the pipes heat too much.

In spite of many advantages claimed, Bockholtz did not succeed in introducing his regenerator, and it was only in 1878 that, by the advice of Böttcher, of Herne, Messrs. Haniel and Lueg, of Dusseldorf, Germany, put in the first regenerator in connection with the pumping-engine for the Clerget shaft of the Herne-Bochum Company. The engine was single direct-acting, with 2-metre cylinder and 3-metre stroke. The arrangement was similar to that shown in Fig. 1, which represents the apparatus at the Friedrich der Grosse Colliery, near Herne, where it was put in a year later attached to a direct double acting engine with 1·62-metre cylinder and 3·77-metre stroke. The first striking advantage obtained by the introduction of the regenerator was that the engines could immediately be run at a considerably greater speed without any danger of their racing. At the Friedrich der Grosse Colliery the number of strokes of the engine could at once be increased from 5 to 7 per minute. This increased the pumping capacity by 40 per cent., a point of incalculable importance at a time when the colliery was fighting the water. These favourable results led to the application of the regenerator to a number of pumping-engines, until the difficulties of keeping the piston air tight led to the idea of replacing the piston by a plunger. The regenerator, thus modified by Messrs. Haniel and Lueg, is shown in Figs. 2 and 3. The plunger, *b*, which moves up and down with the main pump-rod, *a*, works in the stationary air receivers, *c* and *d*, which are mounted in the shaft on the girders, *e*. At the end of the up-stroke of the pump-rod the plunger, *b*, has compressed the air in the receiver, *c*, to the maximum pressure of from 4·5 to 5 atmospheres. In the down-stroke the pressure in this receiver declines gradually, while that in the receiver, *d*, is compressed. In order to make this pressure variable the receivers, *c* and *d*, are filled to a certain height with water introduced by means of a pipe, while the safety valves, *f*, prevent the pressure from going above a given limit. The plunger pipe, *k*, in the receiver, *d*, keeps the compressed air from escaping through the stuffing-box. Any escape of air taking place notwithstanding this precaution is compensated for by the air that is allowed to enter through the air valve, *h*, at every full stroke. The first plunger regenerator was put in in 1881 at the Dechen shaft No. III., at Heinitz, near Saarbrucken, in connection with an Ehrhardt double-acting single cylinder pumping-engine. Elaborate tests were made to ascertain how much the increase in efficiency resulted from the addition of the regenerator. Designating:

P' Average steam pressure on the down-stroke of piston.
P'' " " " up-stroke of piston.
P''' Power required to work the double-acting air-pump.
G Weight of pump-rod with plungers, weights, &c.
C Weight balanced by counterbalance and engine-beam.
G' = *G* − *C* = Effective weight of pump-rod.
Ws Weight of columns of water in suction pipes.
Wd Weight of columns of water in force pipes.
W Total weight of columns of water, equal therefore *W* = *Ws* + *Wd*.
R Friction in engine and pumps during up-stroke and down-stroke.

Since the stroke of the steam-piston and the pump-rod is equal in this case we have:

1.—$P' = G' + Ws + R + P'''$.
2.—$P'' = -G' + Wd + R + P'''$.
3.—$R = \frac{1}{2}(P' + P'' - W) - P'''$ (by adding Nos. 1 and 2).
4.—$G' = \frac{1}{2}(P' - P'' + Wd - Ws)$ (by subtracting Nos. 1 and 2).

If the engine is well balanced the pressure at both ends of the piston must be equal; therefore

$P' = P'' = \frac{1}{2}(P' + P'')$, and the effective weight of the rod is then:

5.—$G' = \frac{1}{2}(Wd - Ws)$.

The engine in question has a diameter of cylinder of 1·177 metre, and 3·14-metre stroke, driving three sets of force pumps, one above the other, with 600 millimetre plungers, their total lift being 197 metres. The engine was designed for five sets and a lift of 300 metres.

From diagrams taken during the trial it was ascertained that the average steam pressure above the piston was 3·413 and below it 2·938 kilogrammes per square centimetre when the regenerator was not used. When the regenerator was employed the pressure was 3·212 kilogrammes above and 2·832 kilogrammes below the piston. The net area of the cylinder above the piston was 10,667 square centimetres, and below it 10,880 square centimetres. Therefore we have:

	Without regenerator.	With regenerator.
P'	= 10,667 × 3·413 = 36,406 kilos.	10,667 × 3·212 = 34,262 kilos.
P''	= 10,880 × 2·938 = 31,965 ,,	10,880 × 2·832 = 30,812 ,,
P'''	= 1,348 kilos.	

The weights of the columns of water are, for the 15 metres of suction column and the 182 metres of force column, *Ws* = 4240 kilogrammes, and *Wd* = 51,450 kilogrammes, making the total *W* = 55,690 kilogrammes. The weight of the entire pump-rod, with plungers, weights, &c., or *G*, is stated to be 76,225 kilogrammes. Of this, 5045 kilogrammes are balanced by the engine-beam, and 42,000 kilogrammes by the counterbalance, leaving the effective pump-rod weight *G'* = 29,180 kilogrammes. Introducing these values we have: $R = \frac{1}{2}(36{,}406 + 31{,}965 - 55{,}690) - 1348 = 49{,}925$. The friction, therefore, amounts to 17·93 per cent. of the effective weight for the double stroke. Introducing values into formula No. 4 the effective weight of rod is computed at 25,825 kilogrammes. This, it will be seen, does not agree with the figure given above, 29,180 kilogrammes, and it is probable, therefore, that the weights that were taken from the books were not quite correct. The effective pressure of the engine is from the data given above:

$$\text{Without regenerator, } \frac{55690 \times 100}{68371} = 81{\cdot}4 \text{ per cent.}$$

$$\text{With the regenerator, } \frac{55690 \times 100}{65075} = 85{\cdot}5 \text{ per cent.}$$

The efficiency of the engine without the regenerator is, therefore exceptionally good, due probably to the cutting off at from ⅔ to ¾ of the stroke. In spite of this fact the introduction of the regenerator has improved it by 4·1 per cent. Besides this, as we shall see, the speed of the engine could be so much increased by the employment of the regenerator that its duty was in that way enhanced by 17·2 per cent.

In order to ascertain what effect the regenerator had on the uniformity of the speed of engine and pumps accurate measurements of the velocity of the pump-rod during the stroke were made with an apparatus specially designed by Siemens and Halske, of Berlin. Diagrams thus obtained are shown in Figs. 4 to 10, both inclusive. Diagrams 4 and 5 show the velocity curves from the Dechen shaft engine, Fig. 4 being the curve obtained when the regenerator was used, while Fig. 5 illustrates it without the regenerator. All the rest are curves from pumping-engines not running with regenerators. No. 6 is from a direct double-acting engine with Davey gear, 1·664-metre diameter of cylinder, and 3·140-metre stroke; No. 7 from a single-acting beam-engine, with 2·2-metre cylinder; No. 8 from a similar engine with 2·09-metre cylinder; No. 9 from a 1·57-metre single direct-acting; and No. 10 from a double-acting rotating Woolf engine with 1·62-metre by 3·77-metre low-pressure cylinder, and 1·2 by 2·79-metre high-pressure cylinder. The following table gives the principal results of these trials:—

	Fig. 4. Regenerator.	Fig. 5.	Fig. 6.	Fig. 7.	Fig. 8.	Fig. 9.	Fig. 10.
Up-stroke of pump-rod, seconds	2·60	3·20	4·20	4·20	3·40	3 00	7·00
Down-stroke of ,, ,,	2·60	3·40	4·00	8·00	3·20	5·60	5·00
Two pauses, ,, ,,	1·60	1·40	2·40	5·80	1·60	5·00	–
Time of double stroke, ,,	7·00	8·20	10·60	18·00	8·20	15·00	13·20
Number of strokes per minute	8·57	7·31	5·66	3·33	7·30	4·00	4·54
Maximum velocity, up-stroke, millimetres	1670	1550	1170	1080	1140	1030	595
Average velocity, up-stroke, millimetres	1177	1050	712	709	764	679	307
Maximum velocity, down-stroke, millimetres	1650	1500	1160	600	1140	720	825
Average velocity, down-stroke, millimetres	1093	894	748	368	813	460	491

A comparison of the velocity diagrams, Figs. 4 and 5, shows that when the regenerator is used there is an almost uniform increase and decrease in the velocity, while without it there are considerable variations. Figs. 6 to 10 show this very clearly, the last being the most favourable.

Two regenerators like the one at the Dechen shaft have been in operation for several months in connection with the pumping-engines at the Urbanus Colliery, near Laugendreer, and at the Otto shaft, at Kloster, Oesede, near Osnabruck. The former is a single-acting beam-engine, with 1·5-metre cylinder and 3·45-meter stroke working three sets of force pumps with 530 millimetre plungers and 2 825 metre stroke, the total lift being 247 metres. Without regenerator the pumping-engine makes 5 strokes, and with it 7·5 strokes. The Otto shaft pumping-engine is of the single-acting beam type. It has a 1·6-metre cylinder and 3·5-metre stroke, the stroke of the pumps being 3 metres. There is one 870 millimetre pump with 65-metre lift, and one 650 millimetre pump with a 73-meter lift. Without the regenerator the engine makes 5 strokes, with it from 8 to 8·5 strokes.

The chief engineer of the Société John Cockerill, of Seraing, M. Kraft de la Saulx, when the power regenerators came under his notice, suggested to Messrs. Haniel and Lueg to so arrange the regenerator that it could be put in single acting at the lower end of the pump-rod with the object of replacing by its action the large weight required for acceleration in rotary pumping-engines. This led (Figs. 11 and 12) to dividing the double-acting regenerator into two parts, one to be attached to the upper part of the pump-rod, and the other to its lower end near the pump.

NEW METAL CAR WHEEL.—A new car wheel, for which it is claimed that it is impossible for any part of the tyre to fly off, however badly the wheel may be fractured, has been invented and patented by Mr. W. G. HAMILTON, of Ramapo, N.Y. The tyre has a shoulder projecting from the inner face, and a number of inwardly-projecting equi-distant lugs of dovetail form. The body of the wheel has outwardly-projecting lugs and shoulder corresponding to the spaces between the tyre lugs. After the tyre is heated the centre piece or body is slipped into the tyre and the lugs made to interlock. The spaces between the lugs are now filled up with soft metal, poured in through holes extending from the centre piece. The wheel so formed is practically one solid piece of metal.

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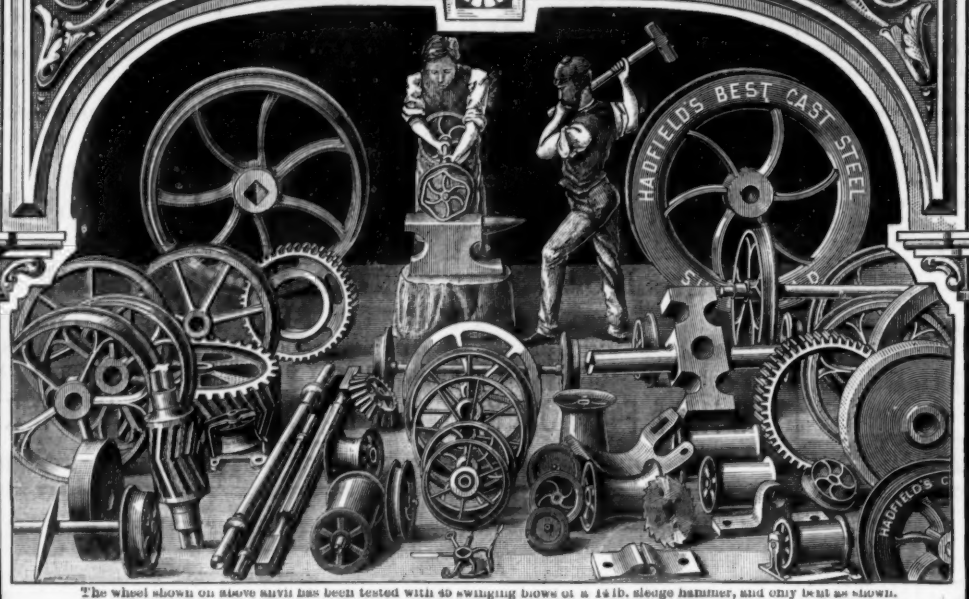

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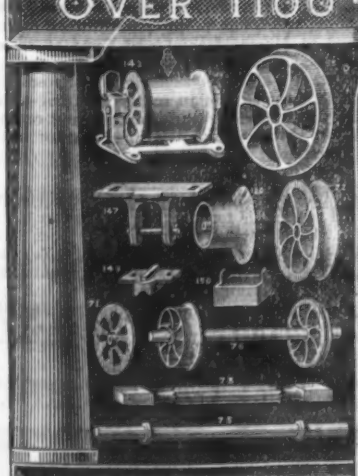

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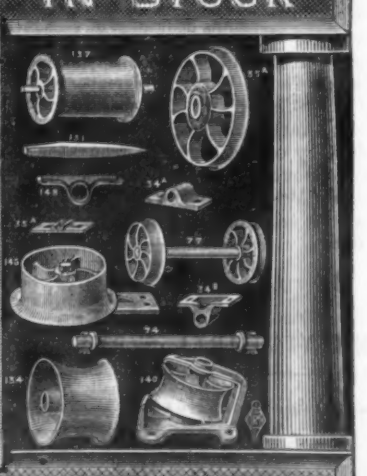

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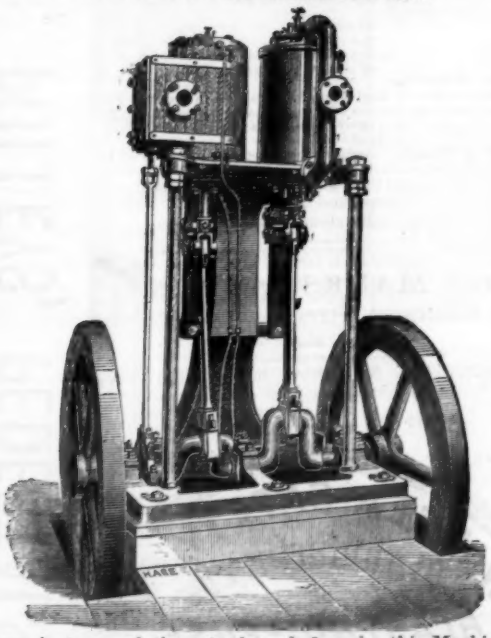

As an instance of the actual work done by this Machinery in various kinds of ground, some of it the hardest rock, it may be mentioned that in Cornwall, irrespective of the work performed by the "Champion" Rock-borers and Air-compressors purchased by various Mines, the drivage, rising, sinking, and stoping done by contract by the Proprietor with his own Machinery now amounts to over 1350 fathoms.

Several of these Air-compressors, ranging from 3½ to 12 tons in weight may be seen in constant work in the Camborne Mining District.

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ENGINEER,
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RAILS—RAILS—RAILS—

New, slightly defective.

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POINT and CROSSINGS with all Fittings complete.
2000 tons in stock ready for delivery.

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For Coals, Wood, Straw, and every kind of Fuel.
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OVER 19,500 SOLD.

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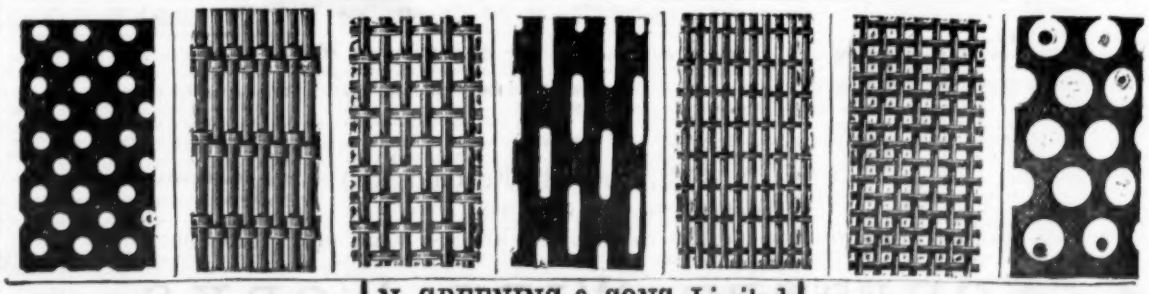

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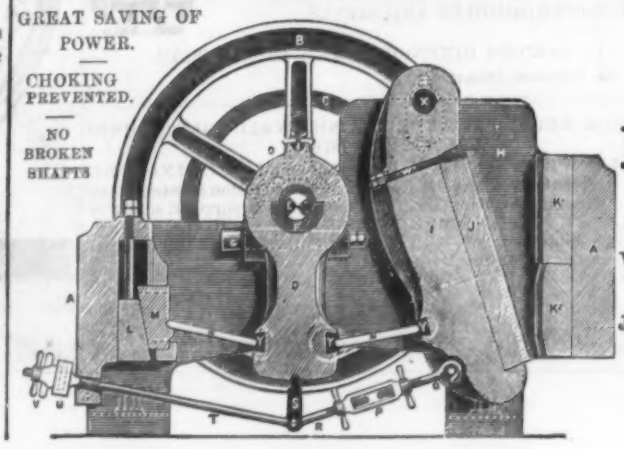

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With PATENT DRAW-BACK MOTION,
WHICH DISPENSES WITH ALL SPRINGS.

JAWS adaptable either for CUBING or CRUSHING.
Reversible in Three Sections, with Surfaced Backs.
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SOLID DRAWN BRASS AND COPPER BOILER TUBES

FOR LOCOMOTIVE OR MARINE BOILERS,

EITHER

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LONDON AGENTS—CHARLES MOSS and Co., 2, Rood Lane, London, E.C.

SILVER MEDALS AWARDED AT CORNWALL POLYTECHNIC 1872 AND 1876.

THE WELL-KNOWN PATENT SELF-ACTING ORE DRESSING MACHINERY, as in operation at most of the large Mines in the Kingdom and Abroad, is now supplied solely by THE PATENTEE AND MANUFACTURER, Mr. GEORGE GREEN, Mining Engineer, AT GREATLY REDUCED PRICES also all descriptions of Mining Machinery, including
GOLD AND SILVER AMALGAMATING MACHINERY, complete
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ROLLER SHELLS FOR CRUSHING MILLS—a speciality.

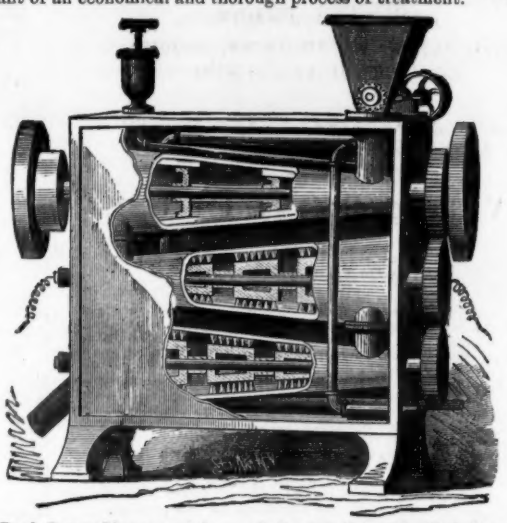
SPECIAL DESIGNS FOR EXPORT AND DIFFICULT TRANSIT.

Prices and particulars on application to the Manufactory, ABERYSTWITH, SOUTH WALES.

NOVEL ELECTRO METALLURGICAL MACHINE.

PROFESSOR JAMES MANES AND SONS call the attention of miners, mineowners, capitalists, and others interested in the working of gold or silver mines to their new Electro Metallurgical Machine for extracting fine and rusty gold from sands or tailings of stamp mills, or the sands of hydraulic gold diggings, or from the black sands on the coast of Oregon or California, and other parts of the world where gold is found.

The problem that has long troubled the worker of free-milling gold and silver ores is a method to save the mineral now lost in the tailings of stamp mills or flumes. This alone, if it could be saved, would amount to many million dollars profit each year, besides enabling the working of much territory which is now lying idle for want of an economical and thorough process of treatment.



Prof. James Manes and Sons, of Denver, Colorado, U.S., have invented a machine (represented in the above engraving) which it is claimed will save nearly the entire amount of mineral which passes through it, the loss not being over 10 per cent., and in many cases not in excess of half that amount. The machine is a cheap and practical process—it never need stop for charging or cleaning up, being nearly self-acting. Steam, electricity, and mercury are used in the process of extracting the mineral.

This machine or amalgamator is adapted for free-milling gold or silver ores, or refractory after roasting. It consists of a series of three or more large cylinders, wider at one end than the other, placed one above the other in a horizontal position, a shaft or spindle running through the centre of each.

The ore and mercury are fed into the first cylinder, passing into the second, and then to the third. The first cylinder is furnished with steel mullers which nearly touch the sides of the cylinder, and revolve at a good rate of speed, mixing the mercury and ore. The second cylinder is furnished with large steel brushes attached to the shaft or spindle, revolving at a high rate of speed; through this a current of electricity is furnished by a Westinghouse dynamic electro machine, which materially assists in gathering the particles of very fine gold together, and thoroughly amalgamating the metal and mercury. The third cylinder is similarly furnished to the second; into this the amalgam passes, and is again acted upon and mixed by the brushes to catch any gold which might have escaped amalgamation in the second. A fourth cylinder may be used if found necessary.

The amalgamated pulp then passes through a revolving copper drum, plated with quicksilver inside. As the drum revolves it takes up the most part of the amalgamated gold. As the inside of the drum is constantly washed with a spray of water from perforated pipes fixed inside of said drum, a clean-plated surface is constantly brought in contact with the pulp or tailings as it passes out from the cylinders. After leaving the drum it falls down on to incline copper plates, the same as is now used in stamp mills.

The amalgam can be collected from the drum and plates without stopping the machine, and any live quicksilver that passes will be caught in syphons. The tailings are carried off with the water. The machine when attached to the flume will be driven by the waste water; it sifts the fine sands from the coarse gravel, and amalgamates it as above.

The specific points claimed by Prof. Manes and Sons in their patent are—

1.—The saving of almost all the mineral passing through the machine.

2.—The loss being less than 10 per cent.

3.—The entire absence of loss of the amalgamated material, thereby saving all the mercury, which, with the processes now in use, there is a large loss both of mercury and the precious metal.

4.—The small cost per ton at which the ore can be treated.

By the addition of the powerful current of electricity that passes off the revolving brushes, the most minute particles of gold will be caught and retained, which in the ordinary flume and stamps passes off with the water; this often amounts to a large percentage.

The inventors state that if English stock companies will give their assistance to work the black sands of Oregon and California by paying for the building of the machines, they will take a share of the gold for their services, or they will send their machines to any part of the world, or will sell patent rights to those desiring any of their patent machines or revolving furnaces for roasting or smelting ores, ball pulverisers, &c.

Prof. James Manes and Sons are agents for the Morey and Sparey Ball Pulveriser, that crushes and pulverises at the same time, and does as much work as eight stamps in a day, crushing either wet or dry.

PRINCIPAL OFFICE OF

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All our machines and furnaces are made by the Colorado Iron Company of Denver, Colorado, the most extensive mining machine works in America.

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This highly reputed Fuse is in constant demand for every description of Blasting in all parts of the world.

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RENEWABLE TOGGLE CUSHIONS, &c.

OVER **4000** IN USE.

Also Cement, Barytes, Limestone, Chalk, Pyrites, Coprolite, &c., &c. These Machines are in successful operation in this country and abroad, and reference to users can be had on application.

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60
FIRST-CLASS GOLD AND SILVER MEDALS,

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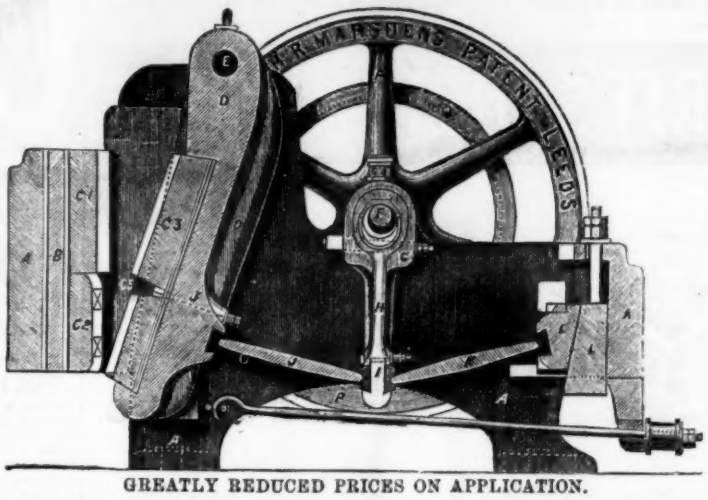
"I now order Three of your Stone Crushers, size 15 × 10, to be of your very best construction, and to include two extra sets of Jaws and Cheeks for each. The last two 24×13 machines you sent me which are at work in this colony, are doing very well. You will soon find that the railway contractors will adopt your machines in preference to the colonial ones—two of which I have. I know other contractors have had as many as nine of them, which have not given very good satisfaction. Once they know of yours thoroughly, I believe you will do a good trade with the colonies. For reference of the high character of your constructions you can refer to me as having used them with the very best results, both in New Zealand and this colony, and much prefer them to the colonial article, both in point of construction and less liability to go out of order. The material we are crushing is very hard blue stone, for railway ballast purposes. Push on with the order as quickly as possible; I do not think it necessary to have any engineering inspection. I have brought your machines prominently under the notice of all large contractors in this colony, likewise the Government. Many of the contractors have spoken to me in reference to their capabilities, and I could only tell them that they are by far and away the best and most economical I ever used. The very fact of me having purchased now Eleven from you at various intervals and various sizes, and two above 12 years ago, and having tried all the other makers, is sufficient guarantee of the capabilities and the working of your machines. Yours in every way surpass all others."

"Some of your testimonials do not give your machines half the due. I have seen men hammering away on a big rock for a quarter of a day which your machine would reduce to the required size in a quarter of a minute. I would guarantee that your largest size machine would reduce more of the Cornish tin capels (which is the hardest rock of England) in a day than 200 men, and at 1-25th the cost."



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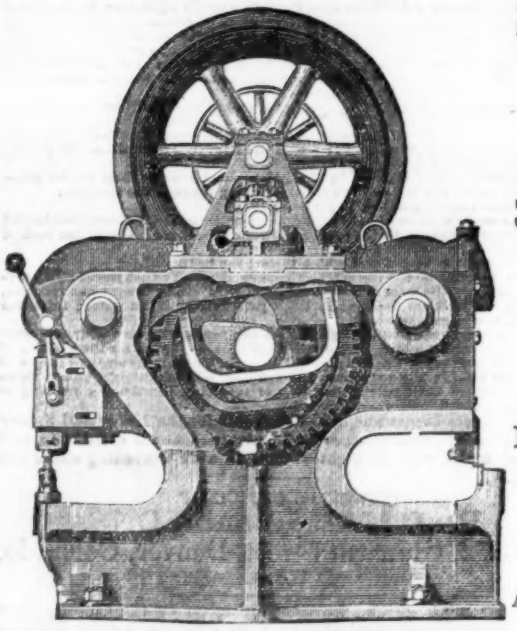

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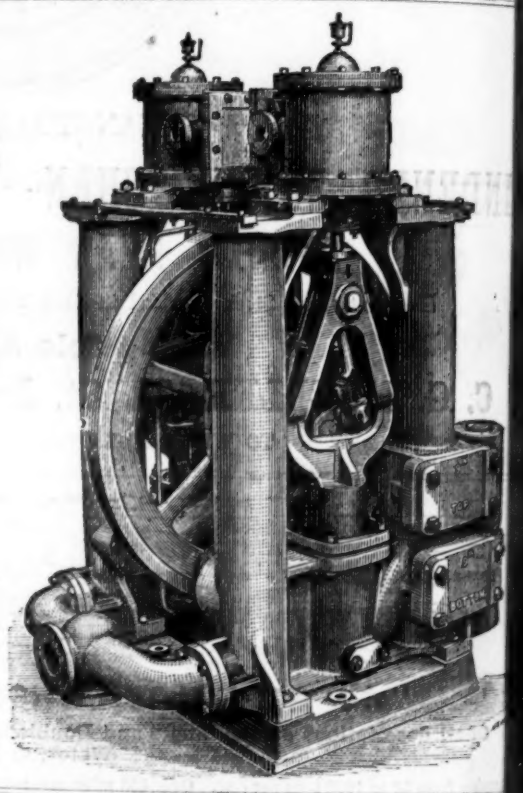

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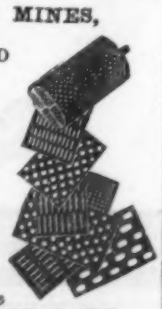

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